Book of Proceedings

February 22-24, 2017

Papers and Proceedings - Forty Seventh Annual Meeting of the Southeast Decision Sciences Institute 2017

SOUTHEAST DECISION SCIENCES INSTITUTE
ANNUAL MEETING
February 22-24, 2017

Proceedings

Program Chair:
Dr. Reza Kheirandish (Clayton State University)

Welcome to the
Southeast Decision Sciences Institute Conference

On behalf of the council, officers, and 2017 program committee, I would like to welcome you to the 47th Annual Meeting of the Southeast Decision Sciences Institute (SEDSI) in Charleston, SC. I am most grateful to the SEDSI Council for their confidence in appointing me. The energy surrounding our annual meeting comes from the opportunity to renew old acquaintances and to meet new colleagues from universities, governments, businesses, and other organizations. I encourage you to pursue existing connections, also to promote our meetings at your institution and to encourage your colleagues to join us in future years. The program committee has put together an excellent conference with about 130 papers, panels and workshops, presented by more than 150 participants, that I think you will find to be enlightening and enjoyable. We are very fortunate this year to have three great publishers and one of the nation's leading statistics software companies participating in the sessions and exhibiting their products in the exhibition area. Please stop by to thank them for their support of our meeting and to see what they have to offer.

I would like to express my sincere gratitude to all of those who helped make this conference possible. It was truly a team effort. Many key individuals worked hard to help develop this conference and program for all of us to enjoy. They include a wonderful team of track chairs, reviewers, session chairs, special session developers, and graduate and undergraduate student paper judges, and my four colleagues Vicky Smith, Heather Chaney, Judith Ogden, and Dolores Cox. Also, included are the officers and council members, both current and past, who were there to offer friendly advice, encouragement, and support throughout the process. I am very grateful to them for offering to share their knowledge and support. Finally, I thank all my colleagues at the College of Business at Clayton State University, specially my Dean, Dr. Avinandan Mukherjee for his continuous support for me and providing everything I needed to plan/organize this meeting. The Hotel coordination/logistics was provided by Drew Rosen, SEDSI website updates by John O'Malley, conference website and branding documents by George Lowry, and I thank all of these individuals for their outstanding support. Suzie smith, Jason Dean, Shanan Gibson, Jim Wynne, Chris Zobel, Ali Nazemi and Chris McCart have worked with me on many instances when I desperately needed their help and have answered my never ending emails! I am sure I have left a few other individuals out, and I apologize for not mentioning everybody's name here, indeed this list is very long!

This year we continued using our last year's conference management system, ExOrdo, and I appreciate their good customer support team for answering ALL of my many questions as we further explored how to navigate the system and put the program together. Hopefully next year it will be easier for everybody.

When our sister organization, SEINFORMS, could not hold their meeting at Myrtle Beach in October due to Hurricane, we thought about providing a venue for their participants to present their papers at SEDSI. As a result of countless efforts by council and officers of both organization, we are very proud to present SEINFORMS@SEDSI sessions. The organizer of these fantastic sessions is Mike Shurden (Lander University). He put in endless effort in organizing 10 sessions of SEINFORMS@SEDSI which you will surly enjoy during the meeting. A "thank you" is also in order, to all SEINFORMS officers, especially Cheryl Aasheim and Jay Teets for their support and making the SEINFORMS@SEDSI a possibility.

In addition to our exhibitor's support, each year we receive sponsorship funds for several coffee

breaks, officers/volunteer reception, President's reception, and President's luncheon. We thank all our sponsors for their valuable support. I would also like to thank Virginia Tech Pamplin College of Business for their exceptional support of the conference this year. A list of all sponsors of SEDSI 2017 is provided below, if you see them during the conference, please stop by and thank them.

I also thank my wife, Shabnam Mousavi, and my daughter, Anoush Kheirandish, for their support all the way. Finally, I would like to thank you, the individual participants, who actually make this meeting possible. Given that many schools are still dealing with limited travel funds, I am aware how hard it is to attend a regional academic conference these past few years and I appreciate your continuous support for SEDSI despite the limited travel funds. Now that you are here for the conference, I urge you all to sit in on as many sessions as possible and to participate in the meeting to its fullest. If you learn something new, see old friends, or meet some new colleagues by the time you leave, in my opinion, the conference is successful. And finally, do not forget to come back next year and bring a new member with you!

Reza Kheirandish, PhD
2017 SEDSI Program Chair

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The Decision Sciences Institute is a professional society dedicated to the development and application of quantitative and behavioral methods to administrative problems. Membership includes representatives from most of the functional areas of business. Through its journals, *Decision Sciences* and the *Decision Sciences Journal of Innovative Education*, along with national, international, and regional meetings, and other activities, the Decision Sciences Institute serves as a vehicle to advance and disseminate the theory, application, pedagogy, and curriculum development of the decision sciences.

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Charleston is one of America's oldest and most historic cities. The holy city (as Charleston is often called) played vital roles in both the revolutionary war and the civil war. Referred to as the holy city because of its many houses of worship; Charleston, and especially the historic downtown market area, has many historic buildings within a short walking distance. There are also ample opportunities to shop for that special memory. No trip to Charleston is complete without visiting the historic open-air market right outside the doors of your hotel. Enjoy your stay in historic Charleston and please come back often.

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Papers/Abstracts/Workshops

A Case Study of a Pop-Up Supply Chain

Elizabeth Rasnick, Georgia Southern University

In the aftermath of a disaster, food stores are already pushed to the breaking point. Often leaving many with rotten or no food. Local food banks normally operate at a break-even level of inventory. When the stress of a disaster is added, they are often overwhelmed. There is an initial and abrupt emptying of their food stores. This is immediately followed by a surge of food supplies and the need for quick distribution. This study investigates the details of this process following Hurricane Matthew in Bulloch County, Georgia. We look at how the food bank operates under normal conditions and then what plans are operationalized to managed the conditions following a disaster.

Food drops are pop-up food banks that exist for a short period of time, usually less than two days. Food is dropped at a location, inventoried, sorted, and then distributed to those in need. This entire process is typically organized by volunteers, who no training in such operations. What are the factors that contribute to a successful delivery, and distribution of much needed food? That is what this study attempts to determine through interviews and surveys of food drop participants. By knowing what the key factors for a successful pop-up operation are, community volunteers, in an emergency, can effectively dispense the need supplies.

To determine how an impromptu supply chain comes into existence, the organizers of a port-hurricane food drop were interviewed and the volunteers of the same food drop were surveyed. The results indicate that, at least on small scales, efficiency can be achieved in supply chains. This is even true when they are not tightly managed or overseen. This observation contradicts traditional supply chain management philosophies of methodical controls.

A CASE STUDY ON THE FEASIBILITY OF ASSISTIVE TECHNOLOGY IN HELPING PEOPLE WITH DISABILITIES IN DAILY LIVING

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ABSTRACT

Advanced assistive technology is changing the daily habits of people with disabilities to be autonomous in the community. Artificial intelligence technology is empowering people with disabilities to be increasingly independent in society. The authors of this paper are evaluating Amazon Alexa Echo technology in helping people with cognitive and intellectual disabilities at a leading non-profit organization. The authors are learning that Alexa Echo device technology is a feasible improvement and intervention of high satisfaction in the life styles of eligible people with disabilities. The findings of this paper, as a preliminary study, can benefit practitioners and researchers considering current innovation in assistive technology for those with disabilities.

Keywords: Artificial Intelligence, Assistive Device Systems, Humanoid Robotics and Smart Home Systems, M (Mobile)-Health Applications (Apps), People with Disabilities

BACKGROUND OF PAPER

An assistive device system is defined by the Technology-Related Assistance for Individuals with Disabilities Act of 1988 as "any item … or product system … acquired commercially … or customized … to improve [the efficacy] of [people] with disabilities." Assistive technology is delineated in the Americans with Disabilities Act of 1990 and the Assistive Technology Act of 1998 [3]. "The Rights of People with Cognitive Disabilities to Technology" is also defined in the 2012 New York State Delegate Assembly Report [45] and in the 2015 President Obama's Committee for People with Intellectual Disabilities "Leveling the Playing Field [with Assistive Device Technology]" Report [2]. Assistive technology is especially helpful in improving the engaged living of people with cognitive or non-cognitive disabilities who are dependent

frequently on non-profit organizations. These people may be helped in a diversity of educational events, local news and hospital and medication reminders, from conversational interfaces of artificial intelligence device technology [53], so that they may be increasingly independent of non-profit staff [18]. They may be further helped in life styles by the inclusion of expressive humanoid robot [10] [46] [55] and programmable Smart Home [15] [31] systems, integrating m (mobile)-health applications (apps) and sensor tools [8] [19] – innovations often proven for people with disabilities [22] [29]. The technology is improving increasingly the engagement levels of the people in m-health management [12]. The field of assistive device technology is a mesmeric method for non-profit organizations and staff in helping in the independence of people with disabilities.

The field of assistive device technology for people with disabilities – 20% of adults in the United States [20] – is growing in generic higher investment. Estimates denote 165,000 m-health apps on the market for people with or without disabilities in 2016 [52]. Estimates in the literature denote 32,500 emotionally enabled humanoid robotic systems to be focused from 2015 – 2018 on people with disabilities [25], but 3 million Amazon Alexa Echo devices, non-emotionally enabled humanoid-like robots for people with or without disabilities, are currently on this one system in 2016. Given the improvement increasingly in the artificial intelligence of device robotic systems, an investment of $587 million by technology organizations in 2015 is denoted in this technology [20]. The integration of device technology is estimated to be a $58 billion investment by technology organizations in 2016 – 2020 [6], of which Smart Home sensor technology is estimated to be a $13 billion investment by these organizations [6].

The growth of artificial intelligence device technology is evidently highlighting a clear opportunity for non-profit organizations. The improvement and intervention of the technology are highlighting a potential in equalities [14] in the independence of the life styles and in the lives of quality of people with disabilities. Not evidently indicated in the literature is the interoperability of the technology in the living tasks of those with disabilities. Those managing organizational projects may be concerned about the entertainment and fun functionality of the technology as issues precluding productivity of living tasks, the ostensible purpose of the technology. Those with disabilities may be disadvantaged in this technology by issues of accessibility because of disability impairment, affordability of device interoperability, comfortability with humanoid or non-humanoid robotic systems and difficulty in interfacing with the technology, and of learning the technology as a tool [28]. Those with disabilities may be even impacted negatively by biosensor Smart Home Internet of Things technology [43] intruding potentially on privacy [47]. The introduction of assistive artificial intelligence technology for good human lives of quality of those with disabilities [5] may not be inevitable if its practicality is not planned by the non-profit organizations and their staff. This paper presents an evaluation project of assistive artificial intelligence technology, beginning with the Amazon Alexa Echo device technology.

INTRODUCTION TO CASE STUDY

The project of assistive technology commenced at AHRC New York City, a non-profit organization for helping people with developmental and intellectual disabilities (IDD). The non-profit organization engaged the authors in the Seidenberg School of Computer Science and Information Systems and Pace University on the project, as the school was already an organizational partner on diverse outreach projects involving assistive device technologies [24]. The goal of the current project is to help people with disabilities in the organization to be increasingly independent in managing living styles and tasks personal to them, such as events, news and medication reminders relating to their own wellness, through artificial intelligence technology. The intervention of the technology may further help in limiting reliance of the people on the non-profit organizational staff, if the intervention is satisfactory to the staff and especially satisfactory to those with disabilities. The non-profit organization invested in the Amazon Alexa Echo technology, as the functionality of this "next generation" device at $180 a gadget (or $50 for Echo Dot) was also furnished in off-the-shelf tools without further investment.

Amazon Echo is essentially a conversational facility of a cloud system that recognizes from distinctive hosted information diverse inquires of people. Alexa, consisting of 500 apps ("services"), is the intelligence behind Echo that instantly remembers and intuitively responds to patterns of preferences and speech speeds for information requests or searches. Echo responses are initiated by speech [26]:

"Echo, repeat my medication prescription reminders for the day;"

"Echo, repeat my rehabilitation schedules, sessions and therapies for the month," or

"Echo, turn on the lights in my bedroom and turn off the lights in my kitchen, *now!*"

Inquiries are responded by a female humanoid [35], akin to a humanoid robot in the market. Depicted in Figure 1, Echo is a cylinder 9' in height and 3.4" in width, functioning with Wi-Fi 365x24x7 [4] that is hands free for people with or without disabilities with 7 microphones.

Figure 1: **Amazon Alexa Echo Device Technology**

Echo controls daily interactions of requests and responses in archived application histories hosted for further information requests [7]. Features, such as Ask My Buddy, are frequently integrated into Echo by Amazon [48], or even if needed by the non-profit organization, with the Alexa Skills Kit [51]. The Amazon Alexa Echo system is a person-controlled assistant of an environmental hub for organizing optimal personal scenarios of people with or without disabilities, but with potential powerfully promising for those with disabilities.

This paper proposes a study with AHRC New York City – Adult Day Services (ADS) of the potential of the Amazon Alexa Echo system for people with disabilities at this non-profit organization. The practicality or non-practicality of this technology for people with disabilities is a motive of the study, as dissatisfaction with Next Great Gadget systems [27] is noted by practitioner study of those with disabilities [28]. The Alex Echo system is moreover a notable point of study, as the technology is positioned in industry as an environmental hub [49] for information mining opportunity [9] from the technology and from Smart Home technology, even though dissatisfaction is noted in practitioner study in integrating the system into so-called Internet of Things technology [36] [38]. The system, and other systems such as Sound Hound, is nevertheless positioned as a new technology for those with or without disabilities [26]. Therefore, this study may contribute critical insight into the dissatisfaction or satisfaction of people with developmental and intellectual disabilities with the Amazon Alexa Echo technology.

FOCUS OF STUDY

The focus of this study is to evaluate the potential of the Echo functionality for helping people with developmental and intellectual disabilities to be autonomous and independent in life styles and living tasks. The Echo functionality is to be evaluated by factors of comfortability in design in interfacing with the basic system, ease of learning the feature functionality of the technology,

and practicality of the technology, cited generically in the literature [42], in order to insure complexity of the system and extensive training on the technology [33] are not inhibitors to the people with disabilities. The accessibility and affordability of Echo for people with developmental and intellectual disabilities are not factors of inhibition in this particular study, inasmuch as Echo is funded by grants to this non-profit organization. This study is apt as 1 million Echo systems are estimated to be in the market for people with or without disabilities in 2016 [54], and funding for institutions for similar systems of technology focusing on wellness are estimated to be $6.5 billion in 2017 [11]. This project study of the Alexa Echo technology will benefit other non-profit practitioners and researchers pursuing new similar systems of assistive artificial intelligence technology for those with developmental and intellectual disabilities.

METHODOLOGY OF STUDY

The project study team is consisted currently of 1 faculty (second author), 1 computer science and marketing student (first author) and 1 liberal arts student (third author), of the Seidenberg School of Computer Science and Information Systems of Pace University, who are evaluating the Amazon Alexa Echo system with people disabilities at 2 facilities of AHRC New York City – Adult Day Services (ADS), in an overall period of October 2015 – June 2016. The team is concurrently consisting of a pilot of 30* people aged >21<49 with developmental and intellectual disabilities at an approximate mid-spectrum, including 3 with physical disabilities, and 5 staff of the non-profit organization. The team is consisting of 1 project manager of the non-profit organization, who is deciding on the people with disabilities and the staff to be included in the current study, and in future studies, based largely on interest and motivation of the overall population.

The evaluation of the Amazon Alexa Echo system was initiated in interactive moderated phases of 4 hands-on structured sessions in residential simulations and 4 semi-structured subsequent surveys of the 30 people with disabilities and the 5 staff by the 1 project manager and the 2 students. There were an aggregate of 9 repeated ‘day-in-the-life” features of the Alexa Echo system on living tasks (e.g., events) that were evaluated by the mix of the 30 people with disabilities in the sessions (i.e. 9 features x 30 people = 270 responses) and repetitive surveys and by the mix of the 5 staff in the surveys, on the aforementioned 3 factors of comfortability in design in interfacing with the basic system, ease of learning the feature functionality of the technology, and practicality of the technology, based on a Likert-like 6-point quantitative satisfaction scale of very high satisfaction to very low satisfaction, and non-satisfaction of zero, in the 4 sessions. These features of functionality of the Alexa Echo system were cumulatively reviewed with open qualitative questions in the subsequent surveys, which were pretested by the project manager and the students. The findings of the students were progressively reviewed by the faculty professor at the university, without identification of the individual people and the staff. Prior to the sessions and the surveys, the people with developmental and intellectual disabilities and the staff on the project study were generically instructed in the operation of the system by the project manager and the students.

The methodology of the faculty professor and the students followed generic principles for community outreach projects of research [41], such as those with developmental and intellectual disabilities [23], and processes for prior studies [24] with assistive technologies with those with disabilities initiated by the Seidenberg School of the university.

*Norm on Disability Population Studies

PRELIMINARY ANALYSIS OF DATA

The preliminary analysis of the descriptive data from the facility sessions and the information from the surveys from the project study at the non-profit organization is disclosing that Alexa Echo is a feasible intervention for the eligible people with developmental and intellectual disabilities* at the mid-spectrum on the project; and the data and the information from the sessions and the surveys is disclosing equivalent potential of the system to the overall eligible population of people with disabilities with similar traits and without disabilities of mental severity.

Preliminary Analysis of Data on Alexa Echo – Facility Sessions

The preliminary analysis of the quantitative data from the 4 sessions consisting of n=30 people with developmental and intellectual disabilities is cumulatively divulging very high comfortability in design in interfacing with the basic system (45%), very high ease of learning the feature functionality of the technology (46%), and very high practicality of the technology (49%), as described below:

Table 1: **Preliminary Analysis of Data on Echo – Facility Sessions**

Evaluation	Comfortability	Ease of Learning	Practicality	Consolidated
Very High Satisfaction	45% / 41**	46% / 41	49% / 43	46% / 125
High Satisfaction	21% / 18	24% / 21	21% / 19	23% / 58
Intermediate Satisfaction	19% / 17	12% / 11	12% / 11	13% / 37
Low Satisfaction	15% / 14	16% / 15	18% / 17	17% / 46
Very Low Satisfaction	- -	2% / 2	2% / 2	1% / 4
Non-Satisfaction	- -	- -	- -	- -
	100% / 90	100% / 90	100% / 90	100% / 270

**(Evaluation Percentage / Evaluation Responses)

Frustration in the system is limited in the responses of the people with disabilities, once they finished the sessions.

Several (3 / 30) of the people with the disabilities are acting as cheerleaders for the other people in the sessions in the event of frustration in the system.

A few (1 / 30) of the people with disabilities in impairment of sight are having issues with the interface of the system; and a few (2 / 30) with disabilities in impairment in speech are having issues with speaking “Alexa” or “Echo”, but they are improving in precise speaking of “Echo” as a more recognizable term; but several (5 / 30) are having initial issues in pronunciation of sentence speaking, but they are improving in increased interactions on the system.

A few of the people with disabilities (4 / 30) are having initial issues in learning which requests may not be answerable by Echo (e.g., “give me the calendar of night games of my favorite New York Islanders hockey sports team”) if not included in the system so that practical responses may be satisfactory to them.

Staff and students are important in mentoring the people with disabilities in initial interactions with the system, especially with those with impairment in speech.

The practices of the sessions may be improved for novice people with disabilities (3 / 30) if fastness of information requests may be less of a prerequisite and if information stored in the system may not be inadvertently terminated by the system.

The comfortability in design, ease of learning and practicality of the technology are a foundation nevertheless for independence and living quality in the evaluated living tasks.

Preliminary Analysis of Data on Alexa Echo – Surveys

The preliminary analysis of the qualitative information from the personalized surveys of the n=30 people with developmental and intellectual disabilities and the n=5 staff is confirming and cumulatively divulging very high satisfaction with the technology.

The comments of the people with disabilities and the staff are confirming the findings of comfortability, ease of learning and practicality of the technology learned in the sessions.

Most of the people with disabilities (27 / 30) are already motivated and proficient with mobile systems, partially through the non-profit organization, which is indicated in the literature as a prerequisite to further positive receptivity to new technologies [50], such as Alexa Echo, robotics and Smart Home Internet of Things.

None of the people with disabilities are indicating intrusiveness of the self-monitoring tools, though issues of privacy and security were not indicated to the people.

Though residential self-monitoring through Echo is evaluated as very high in satisfaction with the technology, the impact on resultant satisfaction in wellness is speculative in the surveys, a finding indicated also in the literature [44].

Several (7 / 30) of those in the surveys are however indicating residential self-monitoring, irrespective of resultant wellness, as “investing in themselves”, which is also indicated in the literature [40].

Those with disabilities on the project are excited and interested, and enough motivated and proficient, that Echo, and even Internet of Things, are future helpful systems to them (5 / 30) in living tasks beyond wellness.

The comfortability in design, ease of learning the feature functionality, and the practicality of the technology are noted as the foundation for the independence and living quality of the evaluated living tasks of those with developmental and intellectual disabilities.

Preliminary Analysis of Data on Alexa Echo – Sessions and Surveys

A summary of the data and the information is disclosing, in the preliminary analysis, that Alexa Echo is a plausible proposition for increasingly independent living styles of those with developmental and intellectual disabilities.

Though the data and the information from the sessions and the surveys are not creditably divulging a proposal for a decreasingly scenario of staff to support those with the disabilities, the findings are furnishing however a latent proposition for re-engineering the settings of staff support.

The summary of the sessions and the surveys on Alexa Echo is offering a potentially productive proposition for assistive artificial intelligence humanoid technology for those with developmental and intellectual disabilities.

*Names of the people with disabilities on the project are not divulged due to privacy requirements.

Note: Cumulative findings will be complemented and empirically enhanced with detailed feature findings for conference presentation.

PRELIMINARY IMPLICATIONS OF STUDY

The authors are discovering that the Amazon Alexa Echo system is comfortable, easy to learn and functionally practicable for most of the eligible people with developmental and intellectual disabilities in the study. The factors of satisfaction with the Echo technology furnish a foundation for independence in self-monitoring of life styles with the product tools. The implication of independence is that an assistive artificial intelligence system, such as Echo technology, is an impactful innovation of intervention in the lives of those with disabilities living in local residences.

The authors are finding that the Echo system is instrumental in the lives of people with disabilities if they are motivated and proficient to be involved with the technology. Even though the Echo technology is an evident intervention of potential for those with developmental and intellectual disabilities, these people have to have the motivation and the proficiency to be proactive with the tools. Literature is indicating that people with disabilities, as the largest minority group, are living still at a lower quality than those without disabilities since earlier studies [37], even with the pervasiveness of fruitful technology. More profiling of motivated and proficient people with disabilities at the mid-spectrum on Echo, and other similar technologies,

may be a stimulus to those with disabilities not trained in this technology. The implication is that motivation and proficiency in an assistive artificial intelligence system are ingredients in prerequisites for impacting more people with developmental and intellectual disabilities with the technology.

Though the Alexa Echo system is an intervention of potential in the lives of eligible people with developmental and intellectual disabilities, the intervention of Smart Home technology is of more potential. The intervention of a simple Smart Home system may be more powerful than an Echo system for people with disabilities. The authors are finding in the literature [15] that humanoid personalized "robo-companion" systems [16], and other systems [1] beyond the Echo system, may be the eventual inherent robotic Smart Home technology – 15% of the $3 billion Internet of Things market is estimated to be in 2020 in tools for wellness [39]. The Echo system marketed by Amazon is merely a platform of services and tools with the potential of improvement with Smart Home technology [6]. The implication is that assistive artificial humanoid intelligence systems for those with developmental and intellectual disabilities may be a more productive product solution with Smart Home technologies.

The authors are learning that the pilot population on the project is a nucleus for the larger population of those with disabilities interested in the Echo system. The functionality of the system in furnishing not entertainment and fun, but independence in life tasks, including monitoring of wellness, is an incentive for the eligible larger population of people with developmental and intellectual and physical disabilities to be on the next phases of the project study if not studies of other non-profit organizations. This implication is that the non-profit organization may have to increase its external funding investment in assistive artificial intelligence technology for its population with those with disabilities.

Finally, the authors are learning that the Amazon Alexa Echo system, and the integrated or non-integrated Smart Home Internet of Things technology, may have to be investigated for more privacy and more security. Information on the people with developmental and intellectual disabilities housed in the system but divulged inadvertently and hacked in intrusiveness [17] may be eventual issues. The Internet of Things invites issues of particular security [30]. The manufacturer technology organizations of the Echo system tools, especially its open source tools, may not be focusing on privacy and security [32 [34] for this protected population of society. This implication of the study is that minimally non-profit organizations may have to be increasing its privacy and security sensitivity strategy for those with developmental and intellectual disabilities on assistive artificial intelligence tools.

LIMITATIONS AND OPPORTUNITIES OF STUDY

The paper is constrained by preliminary findings of a project of one non-profit organization and one university. The paper is constrained by largely people with developmental and intellectual disabilities as a population for study, as a new proposition may include the differences in familiarity in diverse technologies and in learning styles of not only people with mental disabilities but also more people with physical disabilities. The project study is limited to the

product system of one vendor without Smart Home technology that may provide more province for study. However, the paper is confirming generic practitioner results of the assistive artificial intelligence technology on those with disabilities in society. This paper justifies an empirically integrated and larger-population quantitative study with not only with the Alexa Echo system but with other related robotic Smart Home and Internet of Things technologies.

CONCLUSION OF STUDY

The paper is evaluating the feasibility of assistive artificial intelligence technology, focusing on Amazon Alexa Echo as an enabling technology that may help in the living of people with developmental and intellectual disabilities. From a pilot population project study, of people with the disabilities at a non-profit organization in AHRC New York City – Adult Day Services (ADS), the paper is informing readers that Alexa Echo is a powerful proposition in the improvement of independence in living styles and tasks of eligible people with developmental and intellectual disabilities at mid-spectrum, including improving indices in monitoring wellness. High satisfaction in the information services and in the simplicity of the technology is learned in the study. Smart Home technology is noted to be a more powerful proposition in the next phase of services to people with disabilities with the motivation and proficiency in the technology.

Though the information services of Alexa Echo, and of robotic Smart Home Internet of Things technologies, may be powerful propositions in the qualities of life and in living and sociality tasks with people with disabilities, including self-monitoring of wellness, they may be inhibited by issues of privacy and security of the technology. The manufacturer technology organizations of the Assistive Technology Industry Association (ATTA) and the non-profit organizations may have to pursue a more responsive services strategy with the tools. The paper suggests a new study with more of the people with developmental and intellectual disabilities at mid-spectrum and particularly with physical disabilities that may be helped by Amazon Alexa Echo technology and other assistive artificial intelligence technologies.

In conclusion, this paper, as a preliminary study, can be beneficial to non-profit organizational practitioners, researchers and students in other similar settings pursuing review of assistive artificial intelligence technology for minimally people with developmental and intellectual disabilities, a frequently neglected population of society.

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APPENDIX

Generic Related Resources for Assistive Technology

State Assistive Technology Alternative Financing Program http://www.resna.org/AFTAP/state/index.html
State Technology Assistance Project http://www.resna.org/taproject/at/statecontacts.html
The National Council on Independent Living http://www.ncil.org/

Source: [28]

A GRANTS ADMINISTRATION APPLICATION IDENTIFYING THE BEST PATH TO OPTIMALITY

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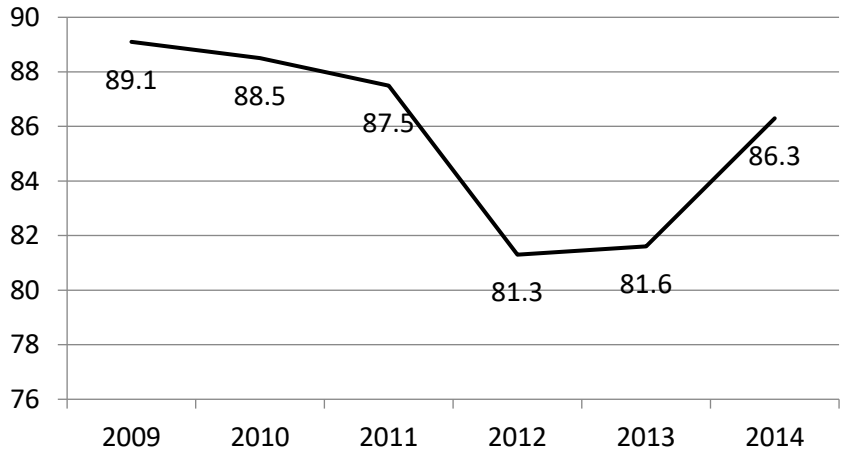
ABSTRACT

This research addresses a grant administration workload-to-staff assignment problem that occurs in the Office of Research and Sponsored Programs (ORSP) at land-grant universities in the pre-award process. We first identify the optimal (utopian) workload assignment plan using a mixed-integer linear programming problem. The optimal assignment of staff members to workload (academic departments) may differ considerably from the status quo, requiring multiple reassignments from the current state to reach optimality. The number of reassignments creates concerns related to loss of administrator-department relationship, loss of department-related knowledge, and increase in managerial inconvenience. To achieve the best workload reassignment with the fewest changes from the current status quo, while still placing a greater emphasis on the effective use of limited resources, we propose and illustrate a multiple objective optimization technique to identify the *n* best departmental reassignments from the current state that provide the greatest progress toward the utopian solution. Solving this problem over several values of *n* and plotting the results allows the decision maker to visualize the trade-off between the number of reassignments and the resulting progress achieved toward the utopian solution. This system supports the ORSP pre-award administrator in making an informed decision about the best number of reassignments (*n*) to choose based on an objective assessment of the relevant trade-offs.

INTRODUCTION

Over the past decade, many public universities faced significant financial challenges due to the unabated reduction in state funding. The State Higher Education Finance Report showed a 7 percent reduction in state support for higher education from 2011 to 2012 representing a $6.2 billion decrease with a slight increase of 0.4% ($300 million) in 2013. [1-4]. More recently, state and local funding increased 5.7% in 2014 reaching $86.3 billion, still short of 2009-2011 levels [4]. Figure 1 summarizes the downward trend in state and local funding for U.S. public higher education from 2009 to 2014. Historically, public universities could transfer budget shortfalls onto the student populace via increased tuition. However, rising negative public sentiment towards university tuition inflation along with the associated ballooning student debt crisis has increased price sensitivity and amplified federal government pressure to curb rising tuition costs [5, 6]. From 2008 to 2013, full-time equivalent educational revenues including tuition increases have dropped on average 5.9 percent in the U.S. [4].

Figure 1: State and Local Funding for Higher Education from 2009 to 2014 [1-4]



While universities have attempted to maintain a sustainable level of revenue to cover operating costs, this has proved difficult due to the fixed nature of most university operating costs coupled with the inability to significantly increase tuition rates to cover funding shortfalls. Therefore, an increasing reliance on government and corporate funding through sponsored grants and research programs has become a mainstay for most research universities. Additionally, academic prestige and research ranking by government agencies, like the National Science Foundation (NSF), are derived from a university's ability to maintain and increase funding levels through research projects. According to the National Science Foundation's Higher Education Research and Development Survey, university spending on research and development grew 6.3 percent from 2010 to 2011, reaching the highest level ever of $65 billion [7].

In 2008, the federal government provided 57 percent of the basic research funding in the U.S. [8, 9], intensifying the workload on potential researchers to search out and apply for research funding opportunities. As one might expect, applying for federal and corporate research funding

can require the completion and submission of a myriad of detailed government mandated forms. The researcher must subsequently provide well-documented results derived from the funded research. The last decade has been a significantly dynamic period for universities, especially in the area of sponsored research. The changing environment has resulted in the following pressing issues that affect research administration and university research: increased competition with other universities and industry partners for research funds, increased regulatory compliance and accountability practices, and significant budget cuts from states [10-12]. Additionally, increasing regulatory compliance and accountability practices requires researchers to spend more time on administrative duties and less time on research [13-16]. As a result, offices of research and sponsored program administration (ORSP) have been setup to handle many such administrative tasks.

Most universities have an Office of Research and Sponsored Programs that assists researchers with the management of the application, review, award, and administration processes of sponsored research [16, 17]. The National Academy of Science stresses the importance of efficient administration of university research due to concerns about increased administrative and regulatory-related reporting requirements [13]. In addition, recent research published by the National Council of University Research Administrators highlights the importance of a good work environment to improve quality and performance of ORSP staff [17]. Given the significance of employee workload as a key determinant of employee satisfaction [17] and efficient administration, it is critical to effectively assign workloads to ORSP staff members so as to minimize the use of overtime and also balance it equitably among ORSP workers.

This research addresses a recurring decision problem that occurs in the ORSP at a large, public, land-grant university in the pre-award process, which includes the application and review portion of sponsored research. We first identify the optimal (utopian) workload assignment plan using a mixed-integer linear programming problem. Unfortunately, the optimal assignment of ORSP staff members to academic departments where the workload is located in this problem may differ considerably from the status quo, requiring multiple reassignments from the current state to reach optimality. The number of reassignments creates concerns related to loss of administrator-department relationship, loss of department-related knowledge, and increase in managerial inconvenience.

To achieve the best workload reassignment with the fewest changes from the current status quo, while still placing a greater emphasis on the effective use of limited resources, we propose and illustrate a multiple objective optimization technique to identify the n best departmental reassignments from the current state that provide the greatest progress toward the utopian solution. Solving this problem over several values of n and plotting the results allows the decision maker to visualize the trade-off between the number of reassignments and the resulting progress achieved toward the utopian solution. This system supports the ORSP pre-award administrator in making an informed decision about the best number of reassignments (n) to choose based on an objective assessment of the relevant trade-offs.

The remainder of this paper is organized as follows. In section 2, a literature review evaluating task assignment, load balancing, and optimality assessment is provided. Section 3 examines our methodology and techniques used to assess the closeness to optimality in relation to the number

of reassignments desired. Section 4 provides a demonstration of the mathematical model and the findings from that implementation followed by conclusions and areas for future work in section 5.

LITERATURE REVIEW

The nature of the work in the present paper leads to an evaluation of literature in task assignment, load balancing, and optimality assessment. A brief overview of these research fields is provided to support the methodology and techniques used to develop and assess the trade-off between the number of reassignments and proximity to optimality.

Task Assignment

In the 1950's, the simple assignment problem assessed a set of n personnel, n job tasks, and individual task qualifications in order to identify the best set of personnel-to-task assignments that maximizes the number of tasks completed while allowing only one task to one person [18, 19]. The personnel-task qualifications were identified with a 1 in the event the person was qualified to complete the task or 0 otherwise. In comparison, the general assignment problem enhanced the simple assignment problem by creating a rating matrix rather than the personnel-task qualifications and strived to maximize the sum of the ratings [18, 19]. The rating matrix utilized positive integers to rate the personnel based on the task rather than a 0-1 classification.

In 1951, Votaw and Orden presented several methods to address the general assignment problem, primarily concentrating on the simplex method, with satisfactory solutions but computational capacity constraints [19]. Later, Kuhn proposed a polynomial algorithm known as the Hungarian method to solve the general assignment problem to improve the computational constraints [18, 20].

Later, the general assignment problem evolved into the generalized assignment problem (GAP) by introducing a cost matrix, allowing multiple tasks to one person, and providing the best set of personnel-to-task assignments based on the minimum total cost [21, 22]. Let the binary variable $x_{ij} = 1$ if person i is assigned to task j; and 0 otherwise. The cost incurred if person i is assigned to task j is denoted by c_{ij}. The resources required by agent i to complete task j is denoted r_{ij} and the total amount of resource available for person i is identified by b_i.The standard formulation of a GAP is the following [21, 23]. Note, the task assignment problem is formulated identical to the GAP with the addition of communication cost in the objective function [24].

$$\textbf{MIN} \sum_{i=1}^{m} \sum_{j=1}^{n} c_{ij} x_{ij} \quad \textbf{(1)}$$

Subject To:

$$\sum_{j=1}^{n} r_{ij} x_{ij} \leq b_i, i = 1, \dots, m \quad \textbf{(2)}$$

$$\sum_{i=1}^{m} x_{ij} = 1,\ j = 1, \dots, n \quad \textbf{(3a)}$$

$$x_{ij} \in \{0, 1\}, i = 1, \dots, n \text{ and } j = 1, \dots, m \quad \textbf{(4)}$$

Given the nature of the GAP being an NP-hard combinatorial optimization problem, Dakin (1965) suggested a tree-search algorithm motivated by Land and Doig (1960) to address such a problem [22, 25, 26]. Later, Ross and Soland (1975) expand on the tree-search method and present the branch and bound method to improve computational efficiency for the GAP.

Notably, personnel-to-task assignments can become a complex resource allocation challenge based on the problem size and integrality requirements. In response, Cattrysse and Van Wassenhove (1992) provided a review of algorithms that address the GAP utilizing different relaxation techniques developed in the 1970's and 1980's [27]. In 2007, Oncan provided a survey of the GAP along with current solution procedures including enhanced relaxation techniques in addition to heuristic and metaheuristic procedures [23]. Once again, relaxation techniques and heuristic procedures are used to improve computational time, although, integer optimal solutions may be difficult to identify.

In addition to various methods to solve the GAP, variations or extensions to the mathematical structure of the GAP have been presented. In 1998, Park et. al presented the generalized multi-assignment problem by altering equation (3a) [28].

$$\sum_{i=1}^{m} x_{ij} \geq a_j \; j = 1, \dots, n \quad \textbf{(3b)}$$

This formulation allows multiple agents to be assigned to a single task. In the event $a_j = 1$ for all *j*, the formulation becomes the GAP. Our proposed method utilizes a similar alteration to the GAP by allowing a set number of agents to be assigned to a single task.

Later, Naus (2004) presented the elastic generalized assignment problem which allows the agents to exceed or violate the resource capacity in equation (2) by using over-time and under-time. Alterations to equations (1) and (2) must be made to introduce the slack and surplus variables with the additional cost of overtime or under-time. Our proposed method allows for overtime and under-time without factoring in the cost or utility.

In 2013, Li et. al. suggests a logarithmic approach to the GAP to reduce the number of binary variables and inequality constraints. This variation is used to improve computational time in large-sized GAPs. To maintain simplicity, we concentrate on the mathematical structure of the GAP demonstrated in Equations (1), (2), (3b) and (4).

Load Balancing

In 2006, Harvey et. al. evaluated the load balancing problem which is an extension of the GAP [29]. Typically, the term load balancing is used in the context of computer processors, distributed systems, and project assignment [30-35]. This research concentrates on the idea of reallocating workload from nodes exceeding capacity to idle or under-utilized nodes to meet or exceed specific performance criteria.

Load balancing can be identified as static or dynamic based on the amount and type of information known a priori to implementation [34, 36]. Static load balancing requires task, resource and system information be known prior to implementation where dynamic load balancing allows for a level of uncertainty and attempts to improve assignment allocation by exchanging information during implementation.

Line balancing is related to load balancing in terms of distributing the work across the workstations equally; however, line balancing also emphasizes workstation precedence constraints [37-39]. The line balancing problem and its underlying problem of task assignment are well-known as it has long been a troubling issue in manufacturing processes. Line Balancing, also known as assembly line balancing, dates back to automobile manufacturing with Henry Ford in 1913 [38, 39]. Specifically, tasks are assigned to workstations in a sequential order on an assembly line to meet one or more objectives.

Salveson formulated the first mathematical line balancing problem in a manufacturing context in 1954 [40, 41]. Since then, more modern manufacturing systems appeared with disassembly, parallel lines, or workstations operated by computer-controlled robots [39, 41]. This has kept the line balancing problem of designing or re-designing the line of current interest to both researchers and practitioners.

Optimality Assessment

The assignment and workload balancing algorithms have one point in common; they seek an optimal solution. At times, knowing what is optimal is not enough and researchers are interested in suboptimal solutions due to model complexity and other issues associated with application and implementation. Most assessments of suboptimal versus optimal solutions are focused on a cost or utility, not the actual number of reassignments. This can be challenging if the cost or utility is difficult to measure, therefore, we propose a multiple objective optimization technique to determine the n best workload reassignments.

In Murty's 1968 article, a partitioning technique is used to rank the k best assignments in order of increasing cost [42]. Although the research is 45 years old, the technique is still used today. In 2008, small modifications of Murty's technique led to the development of an algorithm with a sub-optimal starting point and a search method for the best improvement rather than the lowest degradation [43]. However, that would give us the k-best solutions with regard to our starting point, which would not inform us of the number of reassignments required.

In 2004, Zulch, Rottinger, and Vollstedt acknowledged the issue of reassigning personnel to tasks, specifically in a manufacturing environment [44]. The goal is to reassign personnel to improve the overall utility which includes average lead time, system output, average workload, and labor costs; however, the individual cost of reassignment is not evaluated. A few years later, Gamberini, Grassi, and Rimini evaluate the cost of reassignment when rebalancing of a production line is needed due to changes in parameters [45]. In the model, the rebalance of the line creates a solution that optimizes the line and reduces the cost of reassignment. This logic may reduce the number of reassignments realized, but the decision is not based on the number of reassignments desired. If the cost of reassignment is not known, the technique is not applicable.

Today, workload balancing and optimality assessment is popular in the computer sciences [37, 46, 47]. Indeed, computer resources need to be assigned for tasks and reassigned (or rebalanced) as the priorities of tasks or parameters change with the goal of sparing computing resources. In Gounaris, Yfoulis, and Paton 2012 article, the purpose is not only to assign tasks to resources but to reassign tasks only when it is worth the disturbance [48]. Again, it considers a cost of moving from the current state to an optimum state but not the number of reassignments that are required or desired.

MATHEMATICAL MODEL

We first address the problem of identifying the optimal (utopian) set of assignments of ORSP staff members with varying resource availabilities to academic departments with varying support requirements. We assume that each ORSP staff member may be assigned to a maximum of δ departments. Additionally, each academic department must be assigned one staff member unless the total workload for one department exceeds what one full-time staff member can accommodate. These assignments are made based on estimated department workload hours, ε_j, and ORSP staff member availability of work hours, γ_i. Department workload, ε_j, is estimated by a projected number of proposals each year where each proposal requires a specific amount of work hours. Projecting the number of proposals and hours per proposal is currently handled by ORSP administrators and is outside the scope of this research. However, these projections are a necessary data input for our proposed methodology.

Each ORSP staff member's available number of annual work hours, γ_i, is determined by his/her employment status (e.g. full-time or part-time) and may vary from employee to employee. The parameter τ is the available number of work hours for one full-time employee in a year.

A Model for Optimal ORSP Scheduling

Let the binary variable $x_{ij} = 1$ if staff member i is assigned to academic department j; and 0 otherwise. Let the variable d_{ij} denote the number of workload hours assigned to ORSP staff member i from academic department j. Let the surplus variable o_i denote the number of assigned hours over the available amount for ORSP staff member i and the slack variable u_{i} denote the number of hours under the available amount for ORSP staff member i. Finally, let the variable B denote the maximum individual deviation for all ORSP staff members from their available capacities, γ_i.

A mixed-integer linear programming (MILP) model for this problem is given below in equations (5) - (13). Equations (5), (6), and (7) work in consort to balance the workload among the ORSP employees by minimizing the maximum amount (B) by which any employee's actual assigned hours (dij) differs from his or her available number of hours (γ_i). In equation (6), the slack and surplus variables (ui and oi) measure the deviation between employee i's assigned hours (dij) and available hours (γ_i). Equations (5) and (7) then minimize the maximum of these deviations.

$$\boldsymbol{MIN}\ \mathbf{B} \tag{5}$$

Subject To:

$$\sum_{j=1}^{m} \boldsymbol{d_{ij}} - \boldsymbol{o_i} + \boldsymbol{u_i} = \boldsymbol{\gamma_i}, \forall \boldsymbol{i} \tag{6}$$

$$\boldsymbol{o_i} + \boldsymbol{u_i} - \mathbf{B} \leq \mathbf{0}, \forall \boldsymbol{i} \tag{7}$$

$$\sum_{i=1}^{n} \boldsymbol{d_{ij}} = \boldsymbol{\varepsilon_j}, \forall \boldsymbol{j} \tag{8}$$

$$\sum_{i=1}^{n} \boldsymbol{x_{ij}} = \mathbf{MAX}\left(\mathbf{1}, \left\lceil \frac{\boldsymbol{\varepsilon_j}}{\boldsymbol{\tau}} \right\rceil\right), \forall \boldsymbol{j} \tag{9}$$

$$\sum_{j=1}^{m} \boldsymbol{x_{ij}} \leq \boldsymbol{\delta}, \forall \boldsymbol{i} \tag{10}$$

$$\boldsymbol{\gamma_i x_{ij}} - \boldsymbol{d_{ij}} \geq \mathbf{0}, \forall \boldsymbol{i}, \boldsymbol{j} \tag{11}$$

$$\boldsymbol{x_{ij}} \in \{\mathbf{0}, \mathbf{1}\}, \forall \boldsymbol{i}, \boldsymbol{j} \tag{12}$$

$$\boldsymbol{d_{ij}}, \boldsymbol{o_i}, \boldsymbol{u_i}, \mathbf{B} \geq \mathbf{0} \tag{13}$$

Equation (8) ensures that for each academic department *j* the total amount of workload assigned equals the total amount required. Equation (9) requires each academic department *j* be assigned to only one ORSP staff member, unless the total amount of workload for one department exceeds τ, (or what one full-time staff member can provide). In the event the workload for a department exceeds an even multiple of τ, the ceiling operator in (9) increases the right-hand side value of this constraint to the next highest integer value. Equation (10) ensures each ORSP staff member *i* is assigned to a maximum of δ departments. Equation (11) enforces the logical relationship between the decision variables x_{ij} and d_{ij}. Specifically, constraint (11) ensures ORSP staff member *i* is assigned to academic department *j* if an amount of workload from department *j* is assigned to staff member *i*.

Equation (12) requires the assignment decision variables x_{ij} to be binary. Equation (13) imposes non-negativity constraints for the remaining decision variables. In the event an ORSP manager would like to ensure a particular staff member *i* be assigned to a particular department *j* a simple constraint can be added for the corresponding *i* and *j* values: $x_{ij} = 1$. Similarly, a constraint can be added to ensure a particular staff member *i* is not assigned to a particular department *j* by setting $x_{ij} = 0$.

Modifying the Model for Tradeoffs

The solution to the MILP in (5) - (13) provides an optimal set of work assignments in (as shown later) a reasonable amount of CPU time. However, the "optimal" solution may differ considerably from the status quo, and require multiple reassignments from the current state to

implement. Thus, the optimal solution obtained in this manner is somewhat utopian in that it ignores the relational (and other) costs associated with reassigning ORSP staff from one department to another. That is, the MILP model in (5) - (13) is indifferent between an assignment that achieves the utopian solution's optimal objective function value in 25 reassignments and one that achieves the same utopian objective function value in, say, 10 reassignments. However, the ORSP administrator would likely prefer to make 10 reassignments rather than 25. Furthermore, a solution involving 5 reassignments that achieves 98% of the utopian objective function value might be preferable than the one involving 10 reassignments.

From this discussion, we are motivated to propose a method to determine the *n* best workload reassignments. The MILP model for this problem (for a given value of *n*) is a simple extension of the previous model, with the addition of equation (14) where x_{ij}^* denotes the set of current state variables that are equal to 1 (or, in other words, the set of current ORSP staff assignments), and λ denotes an integer value representing the number of allowable reassignments.

$$\sum \boldsymbol{x_{ij}^*} = \boldsymbol{\lambda} \;\forall\; \boldsymbol{i, j} \in \Omega \textbf{, where } \boldsymbol{\lambda} \textbf{ is Integer and } \Omega = \left\{ \boldsymbol{i, j} \;\middle|\; \boldsymbol{x_{ij}^*} \right\} \qquad \textbf{(14)}$$

Equation (14) is based on the decision maker's selection of the number of reassignments desirable from the current state. The integer value, λ, is calculated by identifying the sum of current state variables and subtracting the number of desired reassignments. This enables the decision maker to assess the number of reassignments in comparison to the resulting solutions' proximity to the utopian solution.

APPLICATION

We demonstrated the value of our MILP method for evaluating the trade-off between the number of reassignments and the resulting progress achieved toward optimality, we utilized data from an American university that engages in extensive funded research. In 2014, this university was ranked in the top 40 universities for research and development expenditures by the National Science Foundation [49].

With the increased focus on research dollars, the American university's ORSP is forced to complete more administrative work with less resources [50] ; the primary resource constraint being staff member availability of work hours [51]. The ORSP management team struggles with making the assignment of academic departments to staff members while keeping the workload as balanced as possible. Currently, the ORSP management team uses their best estimate of what is equal or balanced based on individual experience and personal judgment.

Typically, the ORSP team must rearrange the department-to-staff member assignments numerous times throughout the year in an attempt to keep the workload balanced and staff members content. Unfortunately, the number one complaint by faculty is the constant shift of pre-award administrators [51]. This frustration stems from the faculty's additional time required to initiate, build, and maintain the relationship with the new pre-award administrator. By implementing our MILP method, the ORSP management team can evaluate the trade-off

between the number of reassignments and the resulting progress achieved toward the optimal, balanced set of department-to-staff member assignments.

Identification of Optimal Solution

We identify the optimal set of assignments of ORSP staff to academic departments prior to analyzing the trade-off. In this application, we have 3 scenarios where a trade-off assessment will be demonstrated. Table 1 shows the breakdown of each scenario with regard to the release date of the department-to-staff assignments, number of administrators available including how many are full time versus part time, and the number of departments. In addition, we assume each ORSP staff member can be assigned a maximum of 10 (δ) departments.

We assume 40-hour work weeks with 47 work weeks in a year (52 weeks in a year minus 2 weeks in December and 3 weeks from January-November for vacation and sick time = 47 weeks) totaling 1880 (τ) potential work hours available for one full-time staff member per year. The total available work hours are adjusted for different types of employment status where full-time staff members are given an availability value of 100% and part-time staff members can be given a value of 25%, 50% or 75%. For example, a part-time staff member with a value of 50% will be available 0.5 x 1880 hours totaling 940 hours for the year. Therefore, the parameter γ_i can vary but not exceed 1880 hours. In some instances, the ORSP did not make a work assignment for an academic department; thus, we created a dummy administrator variable and assigned the available departments to that dummy variable. As noted earlier, equation (9) in the utopian model requires each academic department be assigned a minimum of one ORSP staff member. As a result, the dummy variable is assigned 0 hours of availability, or 0% to ensure each department is assigned an actual ORSP administrator.

Table 1: ORSP Optimality Trade-Off Scenarios

Scenario	ORSP Release Date	# of Admins	Dummy Variable	Administrators FT/.25PT/.5PT/.75PT	# of Departments
A	January 2011	13	Yes	8/2/1/2	88
B	March 2011	13	Yes	8/2/1/2	88
C	May 2012	14	Yes	10/2/2/0	88

Each academic department's workload (ε_j) is forecasted by evaluating the year-to-year growth of total number of grant proposals from 2000-2013 showing an average of 1 percent growth. The average level of growth is used to calculate the expected number of proposals for each department in the coming year. We assume the workload per proposal may vary between 4 hours and 12 hours. In our computational testing, the amount of work hours for each proposal will be calculated randomly within this range.

The mixed-integer linear programming model for this problem is optimized using IBM ILOG CPLEX Optimizer 12.5. Table 2 shows each scenario's model characteristics including the number of binary variables, non-negative variables, and constraints.

Table 2: ORSP Optimality Model Characteristics by Scenario

Scenario	# of Binary Variables	# of Non-Negative Variables	# of Constraints
A	1144	1171	1450
B	1144	1171	1450
C	1232	1261	1541

Table 3 shows the utopian objective value for each scenario. Each scenario's objective value is calculated within 0.5 percent of optimality or 2 hours of CPU time. Recall that the objective value is the amount of workload the ORSP employee is overworked in a specific scenario's timeframe. The utopian objective value minimizes the maximum amount of B. The utopian objective value is substantially less that the ORSP objective value, demonstrating the need to balance workload. See table 3 for a more detailed breakdown of each scenario.

Table 3: ORSP Optimality Model Objective Value Results vs. Actual

Scenario	Percent to Optimality	CPU Time (seconds)	Utopian Overwork (hours	ORSP Overwork (hours)
A	98.8%	7200	62	459
B	99.6%	7200	160	820
C	91.4%	7200	24	165

Table 4 shows the number of reassignments for the utopian and actual solutions for each scenario. Unfortunately, the optimal assignment for each scenario requires a large number of reassignments from the current state to reach optimality. As previously stated, the number of reassignments creates concerns related to loss of administrator-department relationship, loss of department-related knowledge, and increase in managerial inconvenience. Therefore, the closeness to optimality assessment is necessary to reduce disruption.

Table 4: ORSP Optimality Model Reassignment Results vs. Actual

Scenario	# Reassignments (Utopian)	# Reassignments (Actual)	ORSP Initial State
A	169	59	September 2010
B	159	5	January 2011
C	157	18	November 2011

Closeness to Optimality Assessment

The current set of assignments of the ORSP staff was identified for each scenario using the organizational staff contacts data from the university's ORSP. The established current state variables (x_{ij}^{*}) were set equal to 1. Using the mixed-integer linear programming model for evaluating the closeness to optimality based on number of reassignments, the tradeoff assessment is identified. We optimized each scenario for various levels of λ. In other words, we allowed 0 to 20 reassignments to be made from the current state. Each value of λ requires the model to be optimized separately.

The mixed-integer linear programming model for this problem is optimized using IBM ILOG CPLEX Optimizer 12.5. In table 5 each model required a certain number of binary variables, non-negative variables, and constraints. Each scenario's tradeoff assessment is calculated within 0.5 percent of optimality or 30 minutes (1800 seconds) of CPU time.

Table 5: ORSP Optimality Trade-off Model Characteristics by Scenario

Scenario	# of Binary Variables	# of Non-Negative Variables	# of Constraints
A	1144	1171	1451
B	1144	1171	1451
C	1232	1261	1542

Scenario A returned infeasible solutions for 0 to 12 allowable reassignments from the current state, demonstrating that the current state did not meet the constraints required to perform adequately given the resources. When we allowed 13 reassignments to be made from current state, we reached 96.8% towards optimality (with an objective value of 263 hours) in 0.03

seconds of CPU time. As the various models are optimized increasing the allowable number of reassignment by 1 integer value at a time, we approach optimality demonstrating a decreasing marginal return. We reach 100% of optimality with an objective value of 62 hours in 279.16 seconds of CPU time when we allowed 20 reassignments. See Figure 2.

Scenario B returned infeasible solutions for 0 to 9 allowable reassignments from the current state, demonstrating that the current state did not meet the constraints required to perform adequately given the resources. When we allowed 10 reassignments to be made from current state, we reached 94.9% towards optimality (with an objective value of 977 hours) in 0.06 seconds of CPU time. We reach 99.9% of optimality with an objective value of 163 hours in 1800 seconds of CPU time when we allowed 20 reassignments. At this point, each additional reassignment provides a small increase in closeness to optimality without an extreme amount of CPU time. See Figure 3 for scenario B tradeoff assessment.

Scenario C returned infeasible solutions for 0 to 5 allowable reassignments from the current state, demonstrating that the current state did not meet the constraints required to perform adequately given the resources. When we allowed 6 reassignments to be made from current state, we reached 94.7% towards optimality (with an objective value of 152 hours) in 0.3 seconds of CPU time. We reach 100% of optimality with an objective value of 24 hours in 1800 seconds of CPU time when we allowed 20 reassignments. See Figure 4 for scenario C tradeoff assessment.

Figure 2: Scenario A Trade-off Assessment: Closeness to Optimality vs. Number of Reassignments

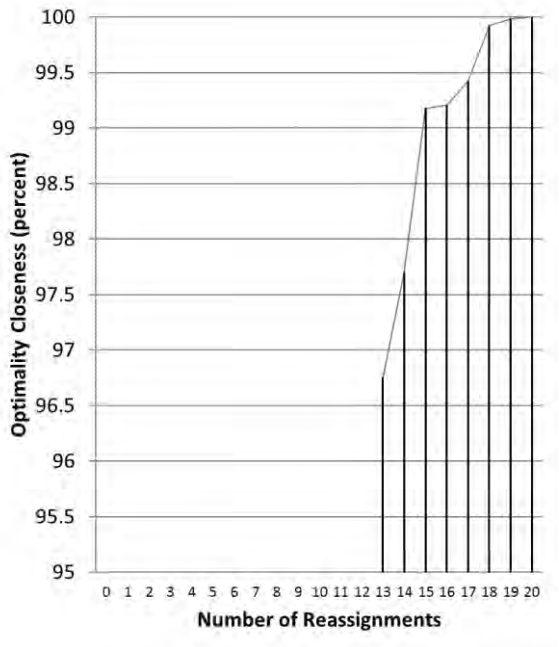


Figure 3: Scenario B Trade-off Assessment: Closeness to Optimality vs. Number of Reassignments

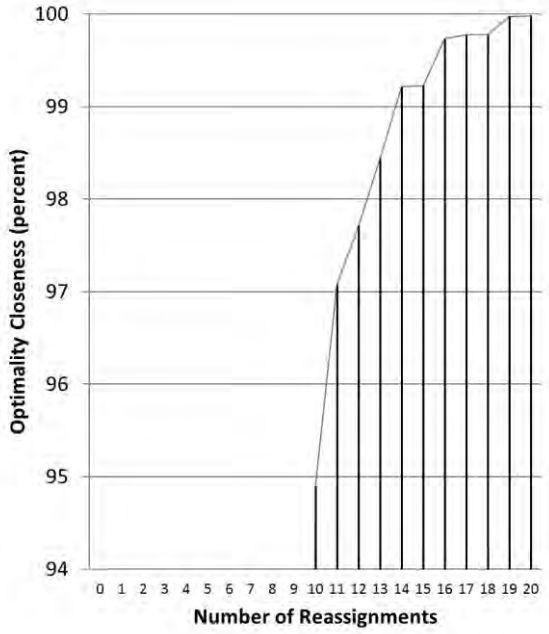
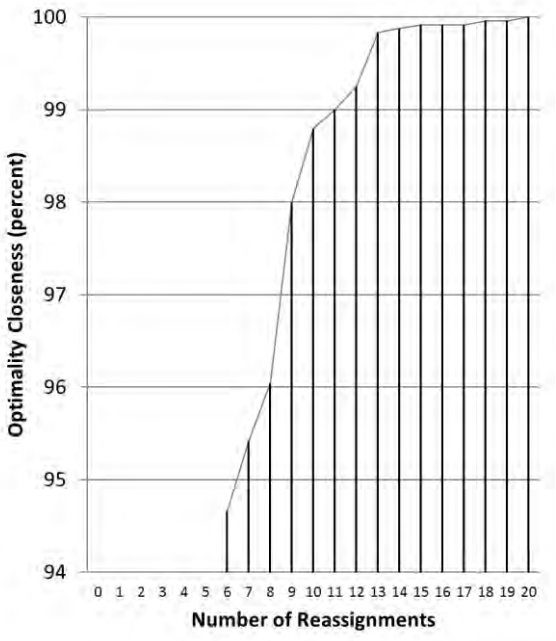


Figure 4: Scenario C Trade-off Assessment: Closeness to Optimality vs. Number of Reassignments



CONCLUSION AND FUTURE RESEARCH

This research addresses the pre-award workload-to-staff assignment of sponsored research in land grant universities. We identify the optimal workload assignment plan using a mixed-integer linear programming problem, although, the optimal assignment may require multiple reassignments from the current state to reach optimality. The number of reassignments creates concern; therefore, we propose a technique to identify the *n* best departmental reassignments from the current state that provide the greatest progress toward the optimal solution. The decision maker can visualize the trade-off between the number of reassignments and the resulting progress achieved toward the optimal solution and make an informed personnel scheduling decision. In addition, this technique can be used in various personnel scheduling domains where the decision maker needs to identify the best number of reassignments (*n*) to choose based on an objective assessment of the relevant trade-offs.

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Acting and Performing: The Influence of Manager Emotional Intelligence

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Acting and Performing: The Influence of Manager Emotional Intelligence

Abstract

We examined the predictive role of manager emotional intelligence (MEI) with regard to emotional labor efforts and outcomes relationships. Several hypotheses were tested to evaluate the influence of MEI on the effects of emotional labor activities employed by subordinates (e.g., surface and active deep acting). Relationships were examined between the emotional labor efforts employed by subordinates and their level of depressed mood, as well as the supervisory evaluations of the subordinates' emotional performance resulting indirectly and directly from the emotional labor activities. Specifically, we hypothesized that MEI will influence the performance of emotional labor and the effects of such activities on depressed mood and emotional performance. Also, findings indicate that MEI moderates the impact of depressed mood on emotional performance. Implications, limitations, and directions for future research are discussed.

According to the U. S. Department of Labor (2015), over 80 percent of jobs in the United States involve some kind of service including interaction with external organizational customers. The development of this service economy has created several changes in how we view organizational performance. The success of an organization no longer depends strictly on procedures and processes. Relationships, networking, and strategic alliances are now buzzwords in the vernacular of successful businesses today. The human element of business is a force of reckoning.

The health of organizations partly depends on the success of interactions between employees and customers, especially so in service environments such as the retail industry. Having direct, face-to-face interactions with customers, front line employees are the contact representatives of organizations. Therefore, certain organizational rules of interaction and emotional display are established to ensure the employee-customer transaction goes smoothly and promotes the organization according to customer expectations. The organization imparts these guidelines explicitly and implicitly in an effort to create a standard for emotional display according to the organization's values and culture.

The satisfaction of these rules through the management of emotion and emotional display is called emotional labor. The rules dictating one's emotional labor in the organizational setting may be explicitly managed, as in the case of a training program where employees are instructed in the ways that they must conduct themselves when interacting with customers. The rules may also, in tandem or without formal employee training, be implicitly managed through the modeling of behaviors by managers and seasoned employees. Invariably, the manager influences the perception, acceptance, and enactment of these rules in the organizational environment. Yet there is no empirical information in the literature regarding the influence of managerial emotional

intelligence (MEI) in the relationship between emotional labor efforts and related outcomes. Indeed, Liu, Prati, Perrewé & Ferris (2008) expressed the need to investigate the extent to which social resources, such as manager instruction, support, and guidance, affect the use of emotional labor strategies through the provision of emotional resources.

In an effort to address this gap in the literature, we suggest that MEI provides the cultural and social resources necessary to influence employee perception, adoption, and execution of organizational display rules. Our general proposal is that MEI contributes to attitudes, behaviors, and performance success of organizational members. This proposal is analyzed through several hypotheses involving the relationships between MEI, emotional labor efforts of subordinate employees in the form of surface and active deep acting, and the evaluations of the individual employee's self-reported depressed mood, as well as his or her emotional performance as recorded by direct supervisors not including the General Manager (see Figure 1). The proposed research questions are tested with data collected from a retail environment where organizational rules of emotional display are followed, whether they are explicitly dictated or simply implied, and management is consistently positioned to interact with the employees, as well as to observe employees' interactions with customers.

Insert Figure 1 about here

Emotional Labor

Hochschild (1983) was the first to coin the term emotional labor, which is the compliance of the employee with organizationally established rules of emotional display. She also explained the various types of activities encompassed by the term, such as surface and deep acting. In this

seminal work, Hochschild warned that prolonged emotional effort to fulfill such requirements could lead to detrimental outcomes for employees. Additionally, Ashforth and Humphrey (1993) warned of potential harm to the organization if these negative effects on employees are not quelled. A great deal of evidence exists to support these notions of the deleterious outcomes of emotional labor (Morris & Feldman, 1997; Abraham, 1998; Pugliesi, 1999; Zapf, Vogt, Seifert, Mertini, & Isic, 1999; Grandey, 2000; Zapf, Seifert, Schmutte, Mertini, & Holz, 2001; Erickson & Ritter, 2001; Brotheridge & Grandey, 2002; Totterdell & Holman, 2003; Côté, 2005).

Conversely, there are also a number of studies to show that emotional labor does not always result in negative outcomes for employees or the organizations in which they work. In fact, there is evidence of positive effects, such as better service performance with some forms of emotional labor, beneficial influences on employee attitudes including increased job satisfaction, self-efficacy, and self-esteem (Ashforth & Humphrey, 1993; Morris & Feldman, 1997; Diefendorff & Richard, 2003; Totterdell & Holman, 2003). Abraham (1998) cited several studies in which the emotional labor requirement is an enjoyable experience and actually serves to increase job satisfaction.

This equivocal nature indicates that certain factors exist to influence emotional labor efforts and their outcomes. Consequently, researchers have indicated that individual characteristics such as self-efficacy, control, self-monitoring, and emotional intelligence may provide further information as to how the emotional labor process affects individuals involved in such work (Abraham, 2000; Grandey, 2000). In the current investigation, explicit and implicit presentations of emotional display rules are considered. The influencing factor of interest in this investigation is MEI.

Theoretically, MEI may apply throughout the emotional labor process from the establishment of organizational rules to the outcomes of the individual employee's performance of emotional labor, and it serves as a valuable resource to the organization and employees. For example, the manager's level of emotional intelligence may influence what organizational rules are established and how these rules are communicated, such as explicit instruction and/or through implication by modeling or correction. Accordingly, MEI may influence how employees perceive organizational rules regarding what type of emotions should be displayed and suppressed based on how these rules are communicated, as well as the subordinates' attitudes toward those rules. Based on MEI, the manager's effectiveness of communicating organizational rules and the influencing behaviors and guidance of the manager, indicate to the employees certain organizational resources available in the required performance of emotional labor. As such, managerial resources may be important to the formation of habitual emotional labor practices and outcomes of those practices as well.

In this particular investigation, the influence of MEI is analyzed to discern the impact it has on subordinate emotional labor efforts and resulting outcomes. According to the literature, evidence supports the idea that supervisors provide the necessary tools for employees to be effective in the work environment (Sy, Tram, & O'Hara, 2006). We propose that the level of MEI will influence emotional labor actions of employees and their effects on employees (i.e., depressed mood) and emotional performance. Essentially, the attitudes, provision of emotional support, and modeling behaviors of managers imputed by MEI will create a blueprint by which employees may use these resources and model their own emotive efforts during the service interaction process.

Emotional Intelligence as a Personal Resource to Influence Emotional Labor Interactions

Emotion has a significant influence on social exchanges (Fineman, 1993). Emotional labor, as a social interaction process, is defined as the display of emotion as a requisite to one's job performance. According to the model established by Mayer and Salovey (1997), "Emotional intelligence involves the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth" (p. 10). In the case of emotional labor, rules of emotional display are strategically formulated for effective employee performance in the emotional labor interaction process. Therefore, emotional intelligence as defined in the Mayer and Salovey (1997) model may be considered essential to the quality performance of emotional labor in such interaction processes.

As delineated in the Mayer and Salovey model above, it would appear that the characteristics of emotional intelligence are directly relevant to the requirements of the emotional labor process, not only with regard to the enactment of emotional display rules, but also relevant to the communication and understanding of those rules. The qualities of emotional intelligence are essential to understanding organizational expectations of emotion display and the effective practice of emotional labor. It is reasonable to assume that the emotionally intelligent individual as a manager is better able to instruct and portray emotional display rules that are communicated to employees. In addition, the emotionally intelligent employee is better equipped to understand, interpret, and fulfill responsibilities of emotional display, and avoid negative feedback or other undesirable outcomes, while maintaining those affective displays that achieve positive results in his or her arsenal of behaviors.

Several authors have incorporated this idea of adaptive emotional regulation as a part of the social interaction model. Rafaeli and Sutton (1987) discussed the interactive relationship of senders and receivers in the communication process. The manager's ability to effectively communicate organizationally appropriate emotional displays through word and deed provides the employee with the proper tools to understand and perform emotional labor duties. This communication between manager (sender) and employee (receiver) is dynamic in that the words the manager says, and his or her portrayal of those statements through actual behavior, will be a constant influence on how the employee perceives the rules of emotional display in the work setting. Accordingly, emotional intelligence is a requirement of the manager in order to establish corresponding perceptions of organizational display rules between manager and employees, and for the employees to understand how those dictates of emotional labor, as communicated by the manager, are to be carried out for successful organizational function.

In addition to emotional performance, the emotional intelligence of managers is a factor in reducing the stress that employees often suffer because of emotional labor practices. On the part of the manager, one's proficiency of instruction through appraisals or modeling is facilitated by his or her emotional intelligence abilities. Himle, Jayaratne, and Thyness (1989) explained how stress is buffered by managerial emotional, instrumental, and informational support. In the case of emotional labor practices, the emotionally intelligent managers have more resources from which they may draw to provide instructional and emotional support for employees.

It should be noted at this point that similar emotional abilities of employees also serve to reduce stress associated with emotional labor. Since Hochschild's (1983) warning of detrimental effects due to emotional labor practices, researchers have found evidence that such practices result in physical and psychological strain. Not only do these deleterious outcomes become a

danger to the employee's health, but may also indirectly affect the health of the organization. Research indicates emotional resources such as emotional intelligence (and its subordinate abilities) may serve as buffers to the development of strain resulting from emotional labor (Schaubroeck and Jones; 2000; Slaski and Cartwright, 2002; Liu & Prati, 2006; Prati et al., 2009). In this investigation, employee emotional intelligence is used as a control variable, and it is not a contributory factor to the evaluation of outcomes.

The Manager: Emotion Rule Engagement and Support

MEI and the Culture of Emotional Intelligence. Research indicates that an employee's emotional display efforts are significantly and positively related to perceived organizational demands for such efforts as related to job performance (Diefendorff and Richard, 2003). Employees receive information regarding organizational expectations from managers. In fact, the managers are not only responsible for the accurate communication of organizational demands, but they are also responsible for motivating employees to perform according to those demands (Ashforth & Humphrey, 1995; Sosik & Megerian, 1999).

Palmer, Walls, Burgess, and Stough (2001) found evidence for the idea that emotionally intelligent leaders may be more equipped to influence subordinate emotions and resulting actions on the job effectively. George (2000) explains that the emotionally intelligent leader's use of emotion allows him or her to influence the behavior and cognition of others not only through effective instruction of appropriate emotional displays, but also through the effective display of such organizationally appropriate emotions. Ashforth and Humphrey (1995) contend that organizational members' motivation toward collective performance is initiated by a leader's use of symbolic management techniques. Prati, Douglas, Ferris, Ammeter, and Buckley (2003)

discussed this line of reasoning in their argument for the influence of emotionally intelligent leaders on supportive team environments.

George and Bettenhausen (1990) theorized that leaders may induce certain moods or actions indirectly through modeling or directly through the leader's emphasis in training, support, and evaluation activities. In their discussion of the pervasiveness of a leader's positive mood and the effect of this mood on subordinates, the authors indicated that leaders with such an orientation would be more inclined to notice and promote positive attitudes and behaviors than would leaders without it. Along these theoretical lines, it is reasonable to assume that a manager with above average capabilities in the emotional realm would notice and encourage actions that display such capabilities in their subordinates.

George and Bettenhausen (1990) also discuss the socialization of organizational members under the direction of such managers in the context of the retail environment. The authors consider several areas (e.g., prosocial behaviors indicated by satisfactory customer service efforts) as target activities for socialization of members. The importance of these target activities may correspond with the manager's focus on such activities and the attitudes and skills by which these activities are performed. Accordingly, George and Bettenhausen (1990) indicate that the leader's disposition and emphasis on socialization contribute to the formation of a group's culture.

Herkenhoff (2004) provides a summarized discourse of findings regarding the relationship of cultural influences on an individual's "situation-emotion-action" process. She suggests that culture (e.g., organizational culture) causes one to adapt perceptions of situational context, and that culture may serve as a filter to feelings based on the situation and resulting actions related to those feelings. She indicates that culture "influences the selection of an action

or behavior," and that "interpretation and expression of emotions are influenced by culture" (p. 75). Indeed, Prati, McMillan-Capehart, and Karriker (2009) established a theoretical influence of MEI on organizational culture and sense-making. It is therefore reasonable to propose that MEI would wield a great amount of beneficial influence in an environment where emotion is salient to the interaction process, considering the manager's influence on the culture of the organization. This beneficial influence is discussed further in the following paragraphs.

MEI and emotion modeling. In the retail industry, store managers not only have the responsibility of maintaining operative business functions and an environment that is representative of the organization's values, but they also are responsible for training, engaging, and motivating employees. Training in the retail environment includes instructing employees to display organizationally appropriate emotions and to emulate demonstrably the organization's rules of emotional display. Social Learning Theory explains that individuals perform according to observations of role models (e.g., managers) and continue various behaviors based upon outcomes that serve to reinforce those behaviors (e.g., implicit or explicit rewards and reprimands) (Bandura, 1986; Wood & Bandura, 1989). Accordingly, managers are the facilitators of subordinate education in organizational requirements of emotional display. They facilitate this education process through implicit reinforcement instruction such as modeling, as well as via explicit behaviors such as formal or informal appraisals and training.

In order to engage employees successfully in upholding the rules of emotional display, the manager must first have a clear understanding of the rules. Emotional intelligence, along with the abilities that fall within the realm of the construct, is important in the clear interpretation of an organization's emotion rules and their purpose. The ability to understand the expected emotions and why they are appropriate is necessary to adopt and represent the emotions. Being

able to engage in pleasant conversation and represent oneself in a cheerful manner is easier to understand in a situation where selling is the primary activity. However, it may take more explanation as to why the organization wishes the customer service representative in charge of returns to engage more standoffish and stern emotional representations.

Emotion regulation is an important ability under the corporate umbrella of emotional intelligence. It is important for managers to represent the rules of emotional display closely for effective modeling of the rules. Managers must portray the standards they set forth in order for employees to see the importance of, and how to portray, the requisite emotional displays. Also, (barring other leader effects) such practices will inspire employees to perform in similar ways. Wood and Bandura (1989) termed this function of modeling "motivational processes." If the manager is able to display the appropriate emotions, resulting in a successful customer service interaction (i.e., a large sale with accompanying commission), then observing employees will be more likely to engage in the same conduct.

Another ability important to the emotional labor process, the ability to perceive, appraise, and express emotions, is essential for successful engagement in emotional labor and accompanying interactions. Not only should the manager be capable of understanding where his or her emotions originated, but also from where the emotions of others emerge. One is more able to handle an enraged customer if he or she first understands what has caused the anger, because he or she is more likely to know how to react. The manager should also be able to display emotions adequately. Saying, "I'm having a great day" does not quite achieve a true representation of the stated words if said with a glum look. This ability to perceive, appraise, and express emotions will allow the manager to moderate and deal with his or her own emotions

as well as the emotions of subordinates, customers, and others who may be engaged in the emotional labor interaction.

Finally, the ability to facilitate thoughts toward requisite emotional displays enables one to engage in active deep acting, described by Hochschild (1983) as the more genuine form of emotional display. Ashforth and Humphrey (1993) suggested that more genuine representations of emotional effort indicate concern for customers; they argue that sincere and genuine emotional expressions are more healthy forms of emotional display for the organization. The manager's ability to facilitate thoughts toward requisite emotional displays, both of him- or herself and the employees, enables managers to have a positive motivating influence over employees.

Hypotheses Development

Emotional labor is a primary responsibility for employees in service industries. In such a business, successful customer service interactions benefit the individual as well as the organization. Emotional acting, in the form of surface or active deep acting, implies some amount of involvement or engagement in one's job, and these actions are executed in order to fulfill some expectation. Morris and Feldman (1996) indicate that active deep acting is associated with engagement in one's work role, as well as personal identification with organizational display rules, and commitment to organizational goals. In both types of emotional labor, efforts or resources are dedicated at some level to the fulfillment of organizational requirements through one's emotional performance.

Côté (2005) indicated in his social interaction model of emotional regulation that surface and deep acting are actions occurring within a feedback loop as the social interaction process takes place. He explains that an employee's emotional labor efforts influence the customer's

behavior. How that customer responds to the employee's actions will provide the employee with information on how to proceed in the interaction process. This interaction loop indicates that the employee is expending energy or resources in order to perform according to customer expectations. Investment in resources indicates some expectation of a payoff.

Liu et al., (2008) indicate that both active deep acting and surface acting require a certain amount of emotional resources. The authors argue that these resources are committed to a task with the expectation that the outcome will be an increase in resources. In other words, one would invest the resources necessary to carry out emotional labor actions in order to obtain more resources as a result of those actions. These additional resources might include increased respect and emotional support from supervisors, associates, and/or customers, improved relationships with individuals associated with those acts and an increase in personal resources, such as an increase in job efficacy and self-esteem. Cartwright and Holmes (2006) argue in support of one such personal resource they term "energy," which provides the tools for positive interactions at work, such as work meaning and involvement. This devotion of resources, or use of energy through the performance of emotional labor efforts, suggests that these efforts are investments in the customer service interaction used to increase the level of one's personal resources upon successful completion of that interaction.

Regarding the performance of emotional labor and associated outcomes, the organizational standards for emotional display dictate how employees must act. In most cases, surface acting is enough to fulfill those requirements. In retail, where positive expressions are the norm, managers encourage employees to greet customers and interact with positive emotional displays. The additional emphasis on cognitive facilitation of the employee's

emotional state toward the positive (as in the case of active deep acting) may not be a standard instruction during socialization and training.

Also, surface acting may be all that is required to conduct a positive customer service interaction. As suggested by Rafaeli (1989), customer expectations for emotional attention may depend on how busy the store is or how rushed the customer is. The researcher found a decrease of positive emotions displayed by clerks when the number of customers waiting for service increased. In a study of restaurant servers, Grandey, Fisk, Mattila, Jansen, and Sideman (2005) found that the perceived authenticity of the server's emotional display provided for a more satisfactory perception of affective service delivery for the customer when the store was slow, but less so when it was busy. Accordingly, it seems possible that surface acting is appropriate to fulfill service and emotional expectations of customers in certain situations, such as instances when customers need to rush for the service or the interaction is extremely short in duration. Regardless of the circumstances, surface acting may be an emotional labor effort that is endorsed by the organization and encouraged through training and example by managers.

Hypothesis 1: Surface acting is positively related to emotional performance.

Active deep acting is represented in the literature as a more amenable method of emotional labor (Rafaeli & Sutton, 1987; Ashforth and Humphrey, 1993). Recent findings have supported the idea that more genuine emotional efforts lead to a higher degree of customer satisfaction with service delivery such as in the case of Grandey et al. (2005). This form of emotional labor may also be observed by persons outside of the interaction process as the more effective of emotional labor efforts. Grandey (2003) found evidence that active deep acting was positively related to peer-rated affective delivery.

In addition, research has found that, in certain cases, active deep acting is a more healthy form of emotional effort for employees. In the area of emotional exhaustion, several studies have found evidence of active deep acting having less of an association with the strain than surface acting (Brotheridge & Grandey, 2002; Brotheridge & Lee, 2002, 2003; Grandy, 2003; Totterdell & Holman, 2003). Liu et al. (2008) found a positive association between active deep acting and job satisfaction, which has of late regained support for having a significant, positive association with performance (Judge, Thoresen, Bono, & Patton, 2001; Saari & Judge, 2004).

Hypothesis 2: Active deep acting is positively related to emotional performance.

Surface acting has been described as the physical attempt to hide the actual feelings of the emotional actor (Zapf, Seifert, Schmutte, Mertini, & Holz, 2001). Hochschild (1983) warned that surface acting can be considered a work stressor. Stress is caused by emotional dissonance in play during the act, which can have a potentially deleterious effect on one's moral self, due to the deceptive nature of the act itself (Prati et al., 2009). Extant literature regarding the dissonant nature of surface acting argues a direct, positive association with depressed mood and other types of psychological strain (Prati et al., 2009).

Hypothesis 3: Surface acting is positively related to depressed mood.

Active deep acting, as indicated above, is less stressful than surface acting. Even though this form of emotional labor still involves a certain amount of emotional dissonance, the effect of reprograming one's emotional state in order feel the way you are required to act appears to result in less strain. Totterdell and Holman (2003) found that active deep acting was not associated with emotional exhaustion. Studies have deduced that certain moderators serve to reduce any deleterious effects that may be suffered by active deep acting (Huang, G.L., Chiaburu, D. S., Zhang, X., Ning, L., Grandey, A. A., 2015; Grandey, A. A., 2003).

Hypothesis 4: Active deep acting is negatively related to depressed mood.

Little if any research has shown a connection between depressed mood and emotional performance, though the relationship is quite intuitive. Goldberg and Huxley (1992) provide several results of depressed mood that indicate a reduction in the ability to provide competent emotional performance. These results of depressed mood include low levels of energy and attentiveness and the reduced desire to engage socially (Allen & Badcock, 2003). Dennis (2007) indicated that depressed mood would inhibit performance in emotional regulation activities due to the lower expectation that the regulation activity would result in rewards.

Hypothesis 5: Depressed mood is negatively related to emotional performance.

Recently, theory and findings indicate that emotional intelligence may be associated with emotional labor efforts and subsequent outcomes (Abraham, 2000; Grandey, 2000; Prati et al., 2009; Liu et al., 2006). Douglas et al. (2004) regarded the emotional intelligence construct as a form of social effectiveness, a set of skills enabling one to "read and understand others, and utilize such knowledge to influence others in the pursuit of individual and/or organizational goals" (p. 2). Côté (2005) suggested that individuals who effectively practice emotional regulation (i.e., the emotionally intelligent) can successfully adapt their messages during interactions, enabling them to respond appropriately to the emotional messages of others.

This study proposes that emotional labor activities associated with MEI contributes to attitudes, behaviors, and emotional performance success of organizational members. Accordingly, the investigative model illustrates the proposed relationships of MEI with emotional efforts in the form of surface and active deep acting. Further, those relationships are examined to evaluate outcomes, including depressed mood and emotional performance. These relationships are discussed in the following discourse.

Evidence in the literature suggests that the emotional intelligence of managers contributes to positive work attitudes and behaviors (Carmeli, 2003) including performance (Sy et al., 2006; Wong & Law, 2002). Sy et al. (2006) summarized research indicating that managers provide the relationship- or emotion-oriented tools for employees to be more cooperative in the work environment and contribute above organizational expectations, leading to better performance. Klimoski and Hayes (1980) found that supervisor support of employee activities was positively and significantly related to employee effort and performance.

Côté (2005) cited previous research to explain that social support (which may include supportive behaviors of managers) aids the employee in carrying out expected emotional labor efforts during customer interactions because this support allows the employee to view the interaction from an emotionally safe place. The employee is able to expend resources through active deep acting or surface acting, according to the encounter. Further, the available support to the employee during the encounter facilitates the surface and active deep acting – outcome relationships. According to this recent literature, it would appear that the abilities of managers to provide an environment of support and emotional safety are influential to employees' effectiveness of performance related to emotional labor activities.

Hypothesis 6: MEI has a positive, direct effect on the relationship between surface acting and emotional performance.

Hypothesis 7: MEI has a positive, direct effect on the relationship between active deep acting and emotional performance.

Hypothesis 8: MEI has a negative, direct effect on the relationship between depressed mood and emotional performance.

Method

Sample

A total of 574 employees and managers from 29 stores of an 87 year-old retail chain were surveyed, and provided 244 complete and useable responses (42.5% response rate). Surveys were distributed to the General Manager of each store with explicit verbal and written instructions on how to distribute the surveys to employees. All survey information was distributed and completed similarly, with the exception of the collection of the emotional performance data.

Emotional performance evaluations labeled for each individual employee were given to floor managers. Employee surveys were coded in order to match them with the emotional performance evaluations submitted by their immediate manager. The General Manager was instructed to evaluate the emotional performance of subordinate managers. This system was designed so that the manager most directly associated with the employee would provide the evaluation of said employee's emotional performance.

Consistent with the demographics of the organization, the sample was primarily female (69.5%) and white (81.0%), with 7.1% African-American, 5.2% Hispanic, 1.0% Asian, and 5.7% who regarded themselves as multicultural. The average age was 31 years with a range of ages between 18 and 72. The average tenure with the organization was 2 years with a range of tenure between 1 month and 30 years. The education level of associates was fairly split with 46.2% having high school degrees and 52.4% having at least some college level course work. Managerial positions were held by 26.2% of the sample, which was also close to the average for managerial staff of stores in this chain.

Measures

Emotional intelligence. The *Self-Report Emotional Intelligence Test* (SREIT) (Schutte, Malouff, Hall, Haggerty, Cooper, Golden, & Dornheim, 1998) was used to measure emotional intelligence of the General Managers for each store surveyed. The *SREIT* is a 33-item self-report measure of emotional intelligence based on Mayor and Salovey's (1997) conceptualization of the construct. It has good reliability, is distinctive from the big five personality factors (Schutte et al., 1998; Schutte & Malouff, 1999; Abraham, 1999, 2000), and is considered an improvement over many other self-report measures (Ciarrochi, Deane, & Anderson, 2002). We used the composite scores of the measure to assess the overall level of emotional intelligence, consistent with past research that suggested the measure could be used as a unidimensional scale (Schutte & Malouff, 1999). A 5-point Likert scale was used, with item responses ranging from "strongly disagree" to "strongly agree." Sample items of the scale are "I know why my emotions change," "I use good moods to help myself keep trying in the face of obstacles," and "I know what other people are feeling just by looking at them." Reliability for this measure was calculated at α = .90.

MEI. In order to evaluate level of MEI, the *SREIT* was used to collect the emotional intelligence score of the General Manager, only, for each store surveyed. All other subordinate managers were included in the information of the general population of employees for each store.

Surface acting. Surface acting was measured using Grandey's (2003) five-item scale. The respondents were asked to report job-related actions used to portray organizationally required emotions when dealing with customers. A 5-point Likert scale was used, with item responses ranging from "never" to "always," indicating the frequency of specific actions

performed by the subject. Items for the scale include questions such as "I fake a good mood" and "I just pretend to have the emotions I need to display for my job." The data yielded a reliability of $\alpha = .88$ for this scale.

Active Deep acting. Active deep acting was measured using questions compiled by Grandey (2003) and Brotheridge and Lee (1998). The respondents were asked to report job-related actions used to portray organizationally required emotions when dealing with customers. A 5-point Likert scale was used, with item responses ranging from "never" to "always," indicating the frequency of specific actions performed by the subject. Items for the scale included questions such as "I make an effort to actually feel the emotions that I need to display to others" and "I really try to feel the emotions I have to show as a part of my job." The data yielded a reliability of $\alpha = .92$ for this scale.

Emotional Performance. Direct supervisors (excluding the General Manager) were asked to rate employees' emotional performance. Items from the scale were created by Grandey (1999) as a 9-item emotional labor measure. These items provided a measure of emotional performance. Supervisors (excluding the General Manager) evaluated the level at which employees fulfilled emotional labor requirements as a part of their customer service performance. Examples of items from this scale included "This person smiles and communicates expressively with customers," "This person shows enthusiasm when dealing with customers," and "This person treats customers with courtesy, respect, and politeness."

A 5-point Likert scale was used, with item responses ranging from "strongly agree" to "strongly disagree," indicating the level of agreement with the statements presented. The scale had a reliability of α=.94.

Analysis and Results

Descriptive statistics and correlations of all study variables are presented in Table 1. We used the Process (Hayes, 2013) software Conceptual Model Template 17 to test the moderating and mediating relationships in our model. Figure 1 shows the resultant significant paths and their coefficients.

INSERT TABLE 1 ABOUT HERE

The set of hypotheses addressing direct relationships between surface acting and emotional performance and active deep acting and emotional performance (Hypotheses 1 and 2, respectively), was not supported, as the paths from surface acting and active deep acting to emotional performance were not significant. The relationship between surface acting and depressed mood is significant, thus supporting Hypothesis 3. The path from active deep acting to depressed mood was not significant, indicating no significant relationship between active deep acting and depressed mood; thus, Hypothesis 4 was not supported. Hypothesis 5, that depressed mood is negatively related to emotional performance, was not supported, indicating that depressed mood does not act as a mediator in the model. Hypothesis 6, that managerial emotional intelligence (MEI) has a positive direct effect on the relationship between surface acting and emotional performance, was not supported. However, MEI has a positive direct effect on the relationship between active deep acting and emotional performance, thus supporting Hypothesis 7 and moderating that relationship. In support of Hypothesis 8 and again acting as a moderator, MEI has a negative, direct effect on the relationship between depressed mood and

emotional performance. That is, the presence of managerial emotional intelligence reverses the suppressive impact of depressed mood on emotional performance.

INSERT FIGURE 1 ABOUT HERE

Discussion

Beginning with Hochschild (1983), researchers realized that emotional labor is a construct of importance, especially in the service environment. Emotional labor takes the form of emotional efforts performed to comply with organizational rules of emotional display. These rules are necessary to navigate the interactions that occur within the organizational work setting (Ashforth & Humphrey, 1995). Because such activities are crucial to organizational success, especially with regard to the services industry, it behooves the scientific community to uncover the intricacies of the service interaction in order to determine what contributes toward that success.

In the present study, the emotional labor efforts, surface and active deep acting, were examined in order to evaluate emotional performance related outcomes. One of the most interesting results had to do with the surface acting-depressed mood-emotional performance relationship. The path was significant in all aspects as predicted, but the moderating effect of MEI on the relationship between depressed mood and emotional performance was quite strong. It appears that MEI may significantly reduce the deleterious effect of depressed mood on subordinate emotional performance.

In addition, we proposed that MEI moderated active deep acting-outcome relationships. Although a significant relationship was not found between active deep acting and emotional

performance, significance was found in the moderating effect of MEI on the relationship between active deep acting and emotional performance. So in both cases of emotional labor studied, a manager's emotional intelligence does have an effect on subordinate emotional performance.

The literature is rich with support for the idea that active deep acting is a beneficial form of emotional labor (e.g., Ashforth & Humphrey, 1993; Brotheridge & Grandey, 2002; Grandey, 2003; Grandey et al., 2005; Rafaeli & Sutton, 1987; Totterdell & Holman, 2003). The results of this investigation further reinforce such findings. The influence of MEI on the relationships between active deep acting efforts of employees and emotional performance indicates that the knowledge (provided through training) and support (provided through cultural socialization and personal encouragement) of an emotionally intelligent supervisor, taking the form of an emotionally intelligent culture, foster positive results from the emotional labor efforts of subordinates.

We assert that this sponsorship of successful emotional labor efforts is due to the culture of emotional intelligence set forth by the manager. Lui et al. (2008) argue that conservation of resources theory provides a framework by which emotional labor strategy may be determined. According to the reasoning provided by Lui et al., the emotionally intelligent manager contributes to the employee's emotional resources, and in so doing, effects positive outcomes from the employee's emotional labor efforts.

The same paradigm may be applied to explain the lack of empirical support found regarding the hypotheses relating to surface acting. The lack of supervisor support from such sources stated above may be the reason for employees to rely on surface acting in order to fulfill the organization's expectations of emotional display. Perhaps the emotional resources are not

available, and as Lui et al. (2008) argue, surface acting is a more favorable form of emotional labor this case. Further, the feedback loop suggested by Côté's (2005) social interaction model of emotional regulation would indicate that MEI would not come into play in relationships where surface acting is involved. MEI simply does not apply in such situations.

Another reason for the lack of support for a mediating role of MEI between surface acting and outcomes may be due to the circumstances when surface acting is employed. As indicated by previous research, it may be that surface acting efforts occur during situations where time is short (Grandey et al., 2005; Morris & Feldman, 1996; Rafaeli, 1989). In other cases, there may not be a need to enter a comprehensive interaction with the customer where anything more than surface acting is necessary, such as simple exchanges during minor or inconsequential purchases (Morris & Feldman, 1996). In these cases, customer expectations are low regarding the emotional performance of the customer service representative.

Limitations

The current study has several limitations. Worthy of mention is the homogeneous sample from the retail industry concentrated in the southeastern part of the United States. In addition, the cross-sectional design limited our ability to draw any causal references regarding the relationships found among variables in the study and to investigate any recursive relationships that may exist. These limitations are similar throughout many of the empirical works in management science today. However, they should not be discounted. Interpretation of these results should be done with caution as generalizability cannot be established by one sample in a design of a cross-sectional nature.

Also, the use of a self-report measure of emotional intelligence is a concern because it could be argued that the measure evaluates something other than the individual's actual EI

abilities, such as one's personality traits or the subject's perception of his or her ability. However, currently available emotional performance-based measures have certain limitations. For example, the Mayer-Salovey-Caruso Emotional Intelligence Test (*MSCEIT*; Mayer, Salovey, & Caruso, 2002) is time intensive, expensive, and complex in nature. In addition, the scoring of this measure has been criticized (Ciarrochi et al., 2002; Elfeinbein, 2007; Mathews, Zeidner, & Roberts, 2002). For example, Mathews and colleagues indicated that the way the *MSCEIT* is scored may be creating the results as an indication of social influence and cultural norms as opposed to an indication of ability.

The *SREIT* was used in this study. It was developed based on Mayor and Salovey's (1997) conceptualization of the construct, and has been shown as distinctive from the big five personality factors (Schutte et al., 1998; Schutte & Malouff, 1999; Abraham, 1999, 2000). It has shown psychometric validity, and is reasonably concise. Again, the results of the study should be interpreted based on the fact that, though this measure has support, there has not yet been an emotional intelligence measure created that is endorsed by a majority of specialists in this area.

As with the other limitations mentioned in this discourse, the measurement issues provide subject matter for future investigations. There is a need for more measures in the area of emotional labor. Researchers need established scales to measure emotional dissonance, emotional labor, and the various types of emotional effort (i.e., passive deep acting and non-acting) that have not, as yet, been investigated.

Future Research and Practical Implications

Up to this point, MEI has been represented as an important factor for effective employee emotional performance. There are many more facets of this valuable resource to discover. What outcomes of MEI or other forms of managerial support may be useful to engage employees in

effective emotional performance? Perhaps MEI may be related to various outcomes that provide for employee emotional performance or other beneficial outcomes. The literature has already presented support for outcomes such as reduced strain (Himle et al., 1989), job satisfaction (Wong & Law, 2002), team effectiveness (Prati et al., 2003), and performance (Sy, Tram, & O'Hara, 2006; Wong & Law, 2002). A plethora of organizationally relevant outcomes remain.

With regard to emotional labor, organizational scientists have yet to evaluate fully the emotional labor interaction process. Researchers like Côté (2005), Morris and Feldman (1997), Zapf et al. (2001), Brotheridge & Grandey (2002), Lui and Prati (2006) have made thoughtful inquiries and uncovered much useful information, but there are more intricacies of the process to explain. For example, what makes active deep acting the more favorable and beneficial form of emotional labor compared to surface acting? What underlying concepts combine to provide such favorable results? Perhaps social support or control over the social interaction process may aid our understanding of the benefits of active deep acting.

Indeed, surface acting has the dubious distinction of being known for ambivalent findings. Is surface acting the miscreant it appears to have been portrayed? Is there a place for surface acting that allows it to be a useful and beneficial form of emotional labor? As presented earlier, research indicates that time constraints and commonplace interactions may provide situations where surface acting is not only useful, but necessary. This type of emotional labor still holds some intrigue for researchers and practitioners.

This exciting and vital area of organizational research is ripe with useful information and applications. The U.S. economy is one of many where a majority of the industries are built, and depend on, satisfactory service and customer contact. We must understand how organizations

dependent on relationship-oriented, successful customer care can sponsor employee actions that facilitate those results.

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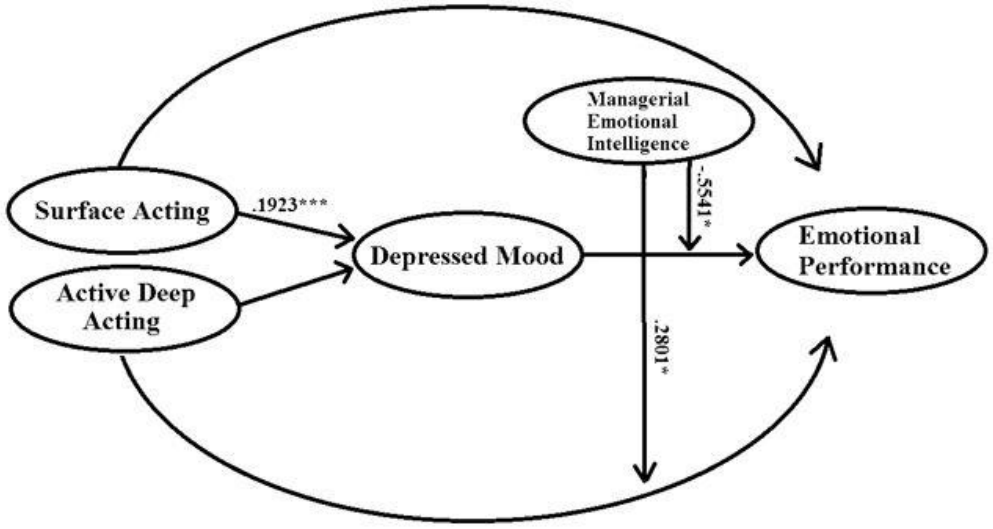
Figure 1

Significant Paths and Coefficients



*p<.05, ***p<.001

Table 1

Means, Standard Deviations, and Correlations for Scaled Variables

Variable	*M*	*SD*	1	2	3	4	5	6
1. Surface Acting	2.20	.836	(.88)					
2. Active Deep Acting	3.01	1.24	-.057	(.92)				
3. Employee EI	3.89	.411	-.164*	.297**	(.90)			
4. Manager EI	4.02	.343	-.035	.016	.205**	(.90)		
5. Depressed Mood	2.23	.595	.192**	-.027	-.356**	-.024	(.80)	
6. Emotional Performance	4.22	.643	-.056	-.044	.121	.301**	-.166*	(.94)

* p=.05, ** p=.01

Note: Coefficient alpha shown on diagonal. N=244

AGE-BASED SOLUTIONS FOR CLASSIFICATION AND SELECTION OF MUTUAL FUNDS

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ABSTRACT

This study analyzes the population of available mutual funds to determine the best funds available for investors. In determining ideal fund choices, asset allocation categories are utilized to identify the mutual funds that best meet an investor's risk capacity, as determined by the investor's age.

INTRODUCTION

In 2008, more than 92 million individuals in the U.S. (about 45% of U.S. households) owned mutual funds but many do not know what they own, why they owned them, and what makes a mutual fund more desirable than the rest. In 2001, the mutual fund industry held over $11.7 trillion worth of assets and funds are available in practically any investment category and size. The mutual fund constituted about 17% of the estimated total of financial securities. There are a number of variables that contribute to the rate of return of a mutual fund and its overall rating and within category ratings. For that reason, many funds use a variety of diversification strategies to achieve favorable returns.

Although, mutual funds were designed to be simple and straightforward, recent developments in the market and increasing popularity of these funds have prompted the introduction of more complex and diversified issues. This in turn, has made the individual, managerial and institutional decisions regarding the purchase of such issues much more difficult, requiring a great deal of analysis both quantitatively and qualitatively.

One of the difficulties encountered by many investors in decisions regarding such financial securities is the large number of decision variables that must be analyzed and taken into account before considering such securities for a portfolio. This becomes particularly important in situations where investors need to achieve certain financial goals at various stages of life and have different risk propensities. In such cases, a robust and easy-to-use decision model is needed to guide the investor in the classification and selection of such financial securities.

Financial advisors earn a living by providing financial advice and investment guidance to individuals and families. Financial advisors serve an important role in a consumer-driven society, where many individuals may not know the best tools and methods to pursue their financial goals. Due to the complex nature of each client's financial needs, it is important for advisors to perform a significant amount of due diligence to be sure that they "know the client". Advisors frequently meet for hours with new clients in an effort to better understand not only their financial goals, but the methods of pursuing those goals that might best meet the client's risk tolerance. Unfortunately, there is no reliable and accepted method for truly understanding another individual's tolerance. While there are numerous models and methods, all are significantly flawed, and frequently provide results that do not match a client's true motivations in practice.

For instance, a client is likely to complete a generally accepted risk-tolerance assessment with results that suggest that the client has an "aggressive" risk tolerance. With no reason to question the client's results, the advisor is practically obligated (given the "know your client" rule by the Financial Industry Regulatory Authority) to suggest "aggressive" investments for the client's portfolio. While the client may be pleased with this strategy for as long as returns are positive, many times a downturn in the economy reveals the client's "true" risk tolerance. Oftentimes, frantic calls are made to the advisor and demands are made to pull their money out of the aggressive investment and reallocated to much more conservative investments – to stop the pain of the investment's short-term losses. In this case (which is not atypical), the client's true risk tolerance and their stated risk tolerance did not match. Oftentimes, suffering an actual downturn in the market is the only method of revealing a client's true risk tolerance.

Because of the difficulty in assessing risk tolerance, many advisors secretly admit that they provide the risk assessment tools to clients for the simple fact that they are required to do so. The "know your client" rule requires that an adequate attempt is made to assess risk tolerance, but unfortunately, advisors have no way to successfully perform this assessment despite numerous attempts [6]. Therefore, advisors may be tempted to simply "check off the box" that they provided the tool in case they are ever sued by the client, or in case regulators ask for it in compliance checks.

While these circumstances are unfortunate, assessing a client's true risk tolerance is terribly difficult, if not impossible due to the biological complexity of human-beings [8]. Although ample efforts have been made to create reliable tools for measuring risk tolerance, persistent flaws exist because of the complexity involved in human decision-making [4] [6] [9] [12].

Given the lack of practicality in adequately assessing risk tolerance, this study suggests that regulators and advisors refocus their efforts from risk tolerance to risk capacity. While risk tolerance is a vague human concept, risk capacity is easily determined. Simply, younger clients have a higher risk capacity and are capable of handling more risk than older clients.

Risk capacity is not a new concept. In fact, there is an old rule of thumb in the financial planning community when it comes to asset allocation. The rule is - subtract your age from 100 – and that is the percentage of your investment assets that you should invest in stocks (with the remainder invested in bonds). This rule of thumb is based solely on a client's risk capacity and does not consider individual risk tolerance. But which stocks and which bonds?

While research has been conducted to address asset allocation choices using age [3], no research has been conducted to aid advisors in the specific selection of investments that best match a client's risk capacity. This study analyzes a collection of over 10,000 mutual funds and using factor analysis, determines the funds that prove to be the most beneficial to investors of a certain age group/risk capacity.

Data & Variables

Through collaboration with an investment company, we have acquired fund-specific information for over 10,500 mutual funds. For this investigation, we intend to narrow down this dataset to include only those funds that meet certain quantifiable characteristics. This is primarily because our model is built based on certain characteristics of diversified stock and/or bond funds.

For the models proposed in this study, several original variables were identified and analyzed to accommodate the complexity of decisions regarding the investment in mutual fund issues. These variables are associated with:

1. The characteristics of issues offered such as asset allocation, risk, return, fees (expenses), and past performance;
2. Requirements of the existing portfolio or investment objectives; and
3. Other elements such as management and external factors that can affect the mutual funds market.

Some of these variables are extremely heterogeneous in nature with complicated characteristics. Among those identified, some are directly associated with the issue itself while others are based on the risk propensity of the decision-maker. We have identified over 50 variables that might impact the decision regarding the selection of a particular mutual fund. Some of these variables were deemed to have only a minimal impact on the model design and were not considered for the model. During the course of study, we anticipate that some new variables may surface and/or some of the existing variables may be eliminated. The following table shows a list of potential variables that may be used in the model.

Potential Decision Variables
Asset Allocation (Fund Category)
Morningstar Overall Rating
YTD Return (November 2015)
1 Year Return (%)
5 Years Average Annual Return (%)
10 Years Average Annual Return (%)
Since Inception Average Annual Return (%)
Inception Date
Years in Existence (Years - calculated)
Risk Rating
Expense Rating
Management Fee (%)
Transaction Fee (Yes/No)
Administration Fee (%)
Load - Sales Charge (%)
Alpha
Beta
Standard Deviation
Sharpe Ratio
12b-1 (%)
Manager Tenure (calculated Years)
Net Assets Value (NAV)
Average Market Capitalization
Turnover Ratio
Credit Quality (if available)
Open to New Investors (Yes/No)
Duration (Years)

Model Design

For our model we had to identify several variables that are based on the investors' financial goals, their stage of the life-cycle and their capacity for risk. Age groups were classified much like popular risk tolerance classifications (conservative, moderately conservative, moderate, moderately aggressive, and aggressive) and based on a life expectancy of most life insurance contracts (100 years).

- Age group 5 – Ages 16-32 (Youngest – Highest risk capacity)
- Age group 4 – Ages 33-49
- Age group 3 – Ages 40-66
- Age group 2 – Ages 67-83
- Age group 1 – Ages 84-100 (Oldest – Lowest risk capacity)

Further, each age group has an assigned return goal. All investments have an inherent risk/return tradeoff. Therefore, investments with higher return potential will have inherently more risk (generally expressed by volatility) than investments with lower returns. Given that younger investors have a higher risk capacity, the return goals will be higher for younger age groups and become lower as the age group increases (thus lowering the risk).

- Age group 5 – Returns greater than 12%
- Age group 4 – Returns greater than 10% but less than 12%
- Age group 3 – Returns greater than 8% but less than 10%
- Age group 2 – Returns greater than 6% but less than 8%
- Age group 1 – Returns greater than 4% but less than 6%

Stock Funds

A popular variable used to determine the risk/return capacity of stock funds is the market capitalization of the firms in which the mutual fund invests. Small-capitalization (or small cap) funds have historically provided higher returns and higher standard deviations (a measure of an investment's risk). Large-cap funds tend to provide lower returns and standard deviations and mid-cap funds fall somewhere in between.

Market Capitalization (Size) Categories	
Large-cap	Market cap over (approx.) $30 billion
Mid-cap	Market cap between (approx.) $10 and $30 billion
Small-cap	Market cap under (approx.) $10 billion

Is this the most important variable in determining the risk/return tradeoff? This study will not only analyze market capitalization, but numerous other categorizations that include:

- Large Blend
- Large Growth
- Large Value
- Mid-cap Blend
- Mid-cap Growth
- Mid-cap Value

- Small Blend
- Small Growth
- Small Value
- World Stock (Global)

International Funds

- China Region
- Diversified Emerging Markets
- Diversified Pacific/Asia
- Europe Stock
- Foreign Large Blend
- Foreign Large Growth
- Foreign Large Value
- Foreign Small/Mid Blend
- Foreign Small/Mid Growth
- Foreign Small/Mid Value
- India Equity
- Japan Stock
- Latin America Stock
- Pacific/Asia ex-Japan Stock

Bond Funds

In the analysis of fixed income, the credit quality of the issuing firm is the most popular variable for determining the risk/return tradeoff of bond funds. For instance, high-yield (junk) bond funds tend to provide higher returns and standard deviations than U.S. Treasury funds. In addition, long-term bond funds have historically provided higher returns than short-term bond funds. Once again this study will analyze the credit quality and the maturity along with numerous other categories to determine the best funds for each age group.

- Short-term Bond
    - Short Government
    - Ultrashort Bond
- Corporate Bond
- Emerging Markets Bond
- High Yield Bond
- Inflation-Protected Bond
- Intermediate Government
- Intermediate-Term Bond
- Long Government
- Long-Term Bond
- Multisector Bond
- World Bond

Stock/Bond Funds

The return potential of asset allocation and balanced funds (combinations of stocks and bonds) is typically expected to be higher the more the fund invests in equities over fixed income.

- Aggressive Allocation
- Moderate Allocation
- Conservative Allocation
- Tactical Allocation
- World Allocation
- Target Date
    - 2000-2010
    - 2011-2015
    - 2016-2020
    - 2021-2025
    - 2026-2030
    - 2031-2035
    - 2036-2040
    - 2041-2045
    - 2046-2050
    - 2051+

Excluded Funds

For the purposes of this study, several classes of funds were excluded from the analysis.

- Undiversified stock funds (Financial, Utility, etc.)
- Municipal bond funds
- Real estate
- Derivatives
- Convertables
- Difficult-to-classify funds (Market Neutral, Nontraditional)

METHODOLOGY, ANALYSIS AND RESULTS

To compare fund performances, we selected the 5-Year return primarily because this data was available for most funds. Also, this selection does not include a significant downturn in the market or eliminate funds that are fairly new. For the first category of funds, clearly large cap and mid cap funds demonstrated stronger returns relative to the other fund classes analyzed.

Capitalization Category	5-Year Return (%)	StDev	Number of Funds
Large Growth	12.81	1.88	570
Large Blend	12.20	1.98	640
Small Growth	11.78	2.33	498
Mid-cap Value	11.49	2.13	160
Large Value	11.38	1.84	317
Mid-cap Growth	11.35	2.35	184
Mid-cap Blend	11.19	2.39	280

Small Blend	10.72	3.22	337
Small Value	10.30	2.52	180
World Stock	7.56	2.53	361

For International stocks, the 5-Year Returns are considerably lower than funds containing US stocks, however within the category, large and mid-cap international stock funds still enjoyed higher overall returns.

Capitalization Category	5-Year Return (%)	StDev	Number of Funds
Foreign Small/Mid Growth	7.48	2.61	62
Foreign Small/Mid Blend	6.29	2.63	26
Japan Stock	5.60	3.51	11
Foreign Small/Mid Value	4.82	2.99	21
Foreign Large Growth	4.67	1.91	141
Diversified Pacific/Asia	3.94	1.35	19
Foreign Large Blend	3.79	2.56	280
Foreign Large Value	3.42	2.12	118
Pacific/Asia ex-Japan Stk	1.43	2.13	23
India Equity	1.02	2.69	7
China Region	0.45	2.66	33
Diversified Emerging Mkts	-3.19	2.70	200
Latin America Stock	-13.16	1.22	15
Europe Stock			48

Returns for Bond funds were all considerably lower as expected**.** Long-term and Government bond funds demonstrated higher returns over the past 5 years.

Capitalization Category	5-Year Return (%)	StDev	Number of Funds
Long-Term Bond	7.64	1.44	2
Long Government	5.81	1.44	18
High Yield Bond	4.77	1.55	286
Corporate Bond	4.19	1.39	74
Multisector Bond	3.93	1.38	91
Intermediate-Term Bond	2.95	0.96	380
Intermediate Government	1.88	0.76	154
Short-term Bond	1.32	0.88	209
World Bond	1.24	2.15	128
Inflation-Protected Bond	0.94	0.73	81
Emerging Markets Bond	0.70	3.05	73
Ultrashort Bond	0.62	0.58	46
Short Government	0.61	0.58	58

For Balanced funds, 5-Year Returns were much higher with aggressively allocated funds as funds with a higher equity percentage enjoyed stronger overall performance.

Capitalization Category	5-Year Return (%)	StDev	Number of Funds
Target Date 2051+	9.39	1.06	12
Target Date 2041-2045	8.42	1.15	31
Target Date 2031-2035	8.15	1.33	33
Aggressive Allocation	7.98	1.72	148
Target Date 2046-2050	7.97	1.91	40
Target Date 2036-2040	7.78	1.87	43
Moderate Allocation	7.43	2.09	312
Target Date 2021-2025	7.11	1.34	31
Target Date 2026-2030	7.05	1.86	52
Target Date 2016-2020	5.75	1.65	51
Target Date 2011-2015	5.63	1.41	29
Target Date 2000-2010	5.02	1.41	31
World Allocation	4.64	2.45	169
Conservative Allocation	4.57	1.85	236
Tactical Allocation	3.43	2.84	75

Measure of Volatility

While knowing the "average" return on a mutual fund is helpful, consider that the average return provides no insight into the dispersion of returns that make up the average. The investment could have an average return with a narrow dispersion or a wide dispersion. The average, by itself, sheds no light on how tight (or wide) the dispersion of returns.

This dispersion of return is the basic measure for risk in an investment. Another term used to describe a single investment's risk is its "volatility". In finance, volatility is a measure of the variation of a security's price over time and it is measured by the dispersion of returns for a given security or index.

The larger a security's standard deviation, the more the security's returns are deviating from the expected (or mean) return. Thus, standard deviation provides a quantitative tool for comparing the volatility (risk) of different investments. The more deviation – the more risk.

Sharpe Ratio

The Sharpe ratio is one of the most popular measures of the risk/return used in mutual fund evaluation. The Sharpe ratio measures a portfolio's risk premium divided by the standard deviation of the portfolio. In other words, the Sharpe ratio provides the amount of excess return received, relative to the extra volatility endured while holding the fund.

$$\textbf{Sharpe ratio} = (R_p - R_f) / \sigma_p$$

Where:

- R_p = The return of the portfolio
- R_f = The risk-free rate

- O_p = The standard deviation of the portfolio

The Sharpe ratio helps investors compare the risk-adjusted returns of one mutual fund to another. The higher the Sharpe ratio, the more the investor is being rewarded for the level of risk that has been assumed.

For our first asset allocation category, the Sharpe Ratio is higher for large and mid-cap funds. This indicates that investors are better compensated for the funds' inherent risks/volatility than investors of small cap funds and world stock. However, it is noted that the standard deviation of the Sharpe Ratio is higher for small-cap funds and world stock, suggesting that these asset classes may have a greater number of individual fund selections that provide excess returns given the level of volatility and a greater number of individual fund selections that fail in this same regard. This is important for those investors seeking higher returns since those returns will be associated with a higher level of fund-specific risk.

Capitalization Category	Sharpe Ratio	StDev
Large Blend	1.01	0.16
Large Growth	1.00	0.14
Large Value	0.96	0.17
Mid-cap Value	0.86	0.17
Mid-cap Growth	0.85	0.19
Mid-cap Blend	0.84	0.16
Small Growth	0.79	0.15
Small Blend	0.74	0.19
Small Value	0.73	0.15
World Stock	0.64	0.20

On average, international funds had lower Sharpe Ratios but a greater dispersion (as demonstrated by the Sharpe Ratio standard deviation) than did domestic funds. A greater dispersion of Sharpe Ratio standard deviations suggests that individual fund selection may be even more important for this category than in domestic securities. This information also needs to be considered along with lower returns for international funds over the past five years.

Capitalization Category	Sharpe Ratio	StDev
Foreign Small/Mid Growth	0.59	0.17
Foreign Small/Mid Blend	0.54	0.19
Japan Stock	0.51	0.22
Europe Stock	0.46	0.15
Foreign Large Growth	0.40	0.12
Foreign Small/Mid Value	0.37	0.19
Diversified Pacific/Asia	0.36	0.08
Foreign Large Blend	0.35	0.14
Foreign Large Value	0.32	0.18
Pacific/Asia ex-Japan Stk	0.19	0.13
India Equity	0.17	0.10
China Region	0.15	0.20

Diversified Emerging Mkts	-0.09	0.15
Latin America Stock	-0.52	0.08

Bond Funds should have the lowest level of overall volatility as demonstrated by the standard deviation. However, it is noted that these funds provided the highest Sharpe Ratios and (somewhat surprisingly) the highest standard deviations of Sharpe Ratios. This suggests that the individual fund selections within this asset class may be an important investing decision.

Capitalization Category	Sharpe Ratio	StDev
Intermediate-Term Bond	1.09	0.31
Short-term Bond	1.02	0.54
Corporate Bond	1.00	0.15
Multisector Bond	0.92	0.35
High Yield Bond	0.87	0.31
Intermediate Government	0.86	0.34
Long-Term Bond	0.75	
Ultrashort Bond	0.64	2.59
Short Government	0.63	0.49
Long Government	0.59	0.03
World Bond	0.38	0.53
Inflation-Protected Bond	0.26	0.14
Emerging Markets Bond	0.20	0.32

For Blended Funds, there does not appear to be a noticeable trend in excess return (as demonstrated by the Sharpe Ratio) given the allocation choice between equities and fixed income or the standard deviation of the Sharpe Ratio, suggesting that the flexibility of this category may make it too complex to analyze in this manner.

Capitalization Category	Sharpe Ratio	StDev
Moderate Allocation	0.94	0.23
Target Date 2000-2010	0.90	0.15
Conservative Allocation	0.89	0.31
Target Date 2011-2015	0.87	0.15
Target Date 2051+	0.86	0.11
Target Date 2021-2025	0.84	0.10
Target Date 2016-2020	0.82	0.14
Target Date 2031-2035	0.81	0.10
Target Date 2041-2045	0.80	0.09
Aggressive Allocation	0.78	0.19
Target Date 2026-2030	0.78	0.13
Target Date 2036-2040	0.78	0.12
Target Date 2046-2050	0.78	0.13
World Allocation	0.58	0.24

Tactical Allocation	0.47	0.35

Fees and Expenses

Mutual fund fees and expenses vary substantially from fund to fund. Mutual funds have three different types of fees that they can charge (sales charges, 12b-1 fees, and management fees). These three fees are all reported by the fund, and careful mutual fund investors will likely be able to save money by researching these fees before making a buying decision.

An additional "cost" worth noting is the fund's trading costs. While mutual fund managers may be able to trade more economically than the individual investor, they still incur trading and transaction costs. These costs are not reported directly, but funds with lower turnover not only increase the fund's tax efficiency, they also mean that the fund's trading costs are lower.

Sales Charges

Sales charges are oftentimes referred to as sales loads (or simply loads). These charges are generally associated with load funds that are sold by personal financial advisors and investment brokers. This load is how many brokers make their commission from selling the fund to the investor. In theory, the sales charge compensates the broker for assisting the investor in selecting the best mutual funds for the investor's return goals and risk tolerance.

The sales charge lowers the amount of money that is invested in the fund. For instance, if an investor saves $1,000 into a mutual fund that has a 5% sales charge, only $950 is actually invested in the fund. By law, a sales charge cannot be above 8%, but in practice, funds rarely have loads this high. Most loads fall within a range of 3% to 6%.

Typically, for funds that have sales loads, the loads may be reduced as the investor saves more and more money. Frequently, mutual funds have breakpoints, or dollar investment amounts that will lower the fund's sales charge.

While many funds carry sales loads, there are many more that do not. No-load funds do not carry a sales load as they are distributed directly by an investment company instead of going through an intermediary (like an investment broker). When investing $1,000 into a no-load fund, the entire $1,000 is invested in the fund.

12b-1 Fees

A 12b-1 fee is a mutual fund's annual marketing and distribution expense. The name "12b-1" comes from the section of the Investment Company Act of 1940 that describes the Act's allowance for the fee, and the Act currently limits the amount that investment companies can charge in 12b-1 fees to 1% or less per year. Like sales loads, these fees are designed to further incentivize brokers to sell the fund as generally two-thirds of the 12b-1 fee acts as a "quasi-commission" for the broker selling the fund.

12b-1 fees are always expressed as a percentage and along with management fees are included in the fund's expense ratio.

Management Fees

Unlike sales loads and 12b-1 fees, all mutual funds have management fees. These fees include the compensation that goes to the fund's managers for their time and expertise, as well as the paperwork, reporting, custodial, auditing, and any other expenses that the fund incurs in its daily operations. The structure of management fees can vary, but most are stated as an annual percentage of the assets under management. These percentages can vary widely from fund to fund, but most average between 0.5% and 1% per year.

Expense Ratio

Management fees and 12b-1 fees (if any) make up a mutual fund's expense ratio, which is a measure of what it costs the investment company to operate the mutual fund. Every investor in the fund carries a portion of the burden of paying the expenses associated with managing the fund. The expense ratio is the percentage of the total investment that goes toward managing the fund's operations. Generally, the lower the ratio, the more efficiently the fund is being run (and the better for the investor).

Comparing expense ratios for the domestic funds based on market capitalization show that mutual funds with large to mid-cap equities have consistently had lower expense ratios. This is important since many investors seek to minimize expenses associated with holding such securities. In addition, it appears that the standard deviation of the gross expense ratio is significantly higher for small cap growth funds, suggesting this category may have very expensive and very inexpensive fund choices for investors interested in saving fees.

Capitalization Category	Gross Expense Ratio (%)	StDev
Large Blend	1.21	0.59
Large Growth	1.35	0.61
Large Value	1.25	0.50
Mid-cap Blend	1.37	0.58
Mid-cap Growth	1.46	0.53
Mid-cap Value	1.37	0.57
Small Blend	1.46	0.58
Small Growth	1.61	0.92
Small Value	1.52	0.51
World Stock	1.55	0.56

Expense ratios for international funds were somewhat higher especially for funds that contain Asia and Asia/Pacific stocks and securities. However, with the exception of Japan Stock funds, the standard deviation of the expense ratios appears similar to that of domestic securities.

Capitalization Category	Gross Expense Ratio (%)	StDev
India Equity	2.13	0.59
Pacific/Asia ex-Japan Stk	2.10	1.04
China Region	1.96	0.57
Diversified Emerging Mkts	1.82	0.60
Japan Stock	1.76	1.12
Latin America Stock	1.72	0.50
Foreign Small/Mid Value	1.70	0.44

Europe Stock	1.68	0.74
Foreign Small/Mid Growth	1.67	0.47
Foreign Large Value	1.58	0.83
Foreign Small/Mid Blend	1.56	0.55
Foreign Large Growth	1.47	0.50
Foreign Large Blend	1.44	0.60
Diversified Pacific/Asia	1.43	0.63

For Bond funds, expense ratios are considerably lower as expected. This ratio is very small for Government bonds in particular. In addition, the standard deviation of the expense ratios is somewhat less than for equity funds.

Capitalization Category	Gross Expense Ratio (%)	StDev
Emerging Markets Bond	1.47	0.51
Multisector Bond	1.28	0.48
World Bond	1.26	0.49
High Yield Bond	1.20	0.46
Intermediate-Term Bond	1.08	0.95
Corporate Bond	1.05	0.48
Inflation-Protected Bond	1.04	0.50
Intermediate Government	1.04	0.47
Short-term Bond	0.94	0.42
Long-Term Bond	0.92	0.87
Short Government	0.89	0.42
Ultrashort Bond	0.79	0.33
Long Government	0.54	0.37

Expense ratio for balanced/blended funds are all in mid-range of all asset classifications. This is expected as these funds are a blend of bonds and sticks.

Capitalization Category	Gross Expense Ratio (%)	StDev
Tactical Allocation	1.90	0.62
World Allocation	1.57	0.58
Aggressive Allocation	1.52	0.58
Conservative Allocation	1.38	0.55
Target Date 2046-2050	1.38	0.66
Moderate Allocation	1.37	0.56
Target Date 2036-2040	1.31	0.54
Target Date 2026-2030	1.30	0.51
Target Date 2041-2045	1.29	0.59
Target Date 2016-2020	1.23	0.50
Target Date 2031-2035	1.22	0.51
Target Date 2021-2025	1.18	0.48

Target Date 2011-2015	1.11	0.51
Target Date 2051+	1.11	0.58
Target Date 2000-2010	0.95	0.41

Putting It All Together

Given the return goals and risk capacities of the five age groups, this study's findings suggest the following fund asset classes:

Ages 16-32 (Youngest – Highest risk capacity and Returns greater than 12%)

Classification	Capitalization Category	5-Yr Return	Excess Return Volatility	Expense Ratio
Stock Funds	Large Blend	Very High	Very High	Low
Stock Funds	Large Growth	Very High	High	Medium

Ages 33-49 (High risk capacity and Returns greater than 10% but less than 12%)

Classification	Capitalization Category	5-Yr Return	Excess Return Volatility	Expense Ratio
Stock Funds	Large Value	High	High	Low
Stock Funds	Mid-cap Blend	High	High	Medium
Stock Funds	Mid-cap Growth	High	High	Medium
Stock Funds	Mid-cap Value	High	High	Medium

Ages 40-66 (Medium risk capacity and Returns greater than 8% but less than 10%)

Classification	Capitalization Category	5-Yr Return	Excess Return Volatility	Expense Ratio
Stock Funds	Small Blend	High	Medium	Medium
Stock Funds	Small Growth	High	Medium	High
Stock Funds	Small Value	High	Medium	Medium
Blended Funds	Target Date 2051+	Medium	High	Low
Blended Funds	Target Date 2031-2035	Medium	High	Low
Blended Funds	Target Date 2041-2045	Medium	High	Low

Ages 67-83 (Low risk capacity and Returns greater than 6% but less than 8%)

Classification	Capitalization Category	5-Yr Return	Excess Return Volatility	Expense Ratio
Blended Funds	Target Date 2021-2025	Low	High	Low
Blended Funds	Moderate Allocation	Low	High	Medium
Bond Funds	Long-Term Bond	Low	Medium	Very Low
Stock Funds	World Stock	Low	Medium	Medium
Blended Funds	Aggressive Allocation	Low	Medium	Medium
Blended Funds	Target Date 2026-2030	Low	Medium	Medium
Blended Funds	Target Date 2036-2040	Low	Medium	Medium
Blended Funds	Target Date 2046-2050	Low	Medium	Medium
International Funds	Foreign Small/Mid Blend	Low	Low	Medium
International Funds	Foreign Small/Mid Growth	Low	Low	High

Ages 84-100 (Oldest – Lowest risk capacity and Returns greater than 4% but less than 6%)

Classification	Capitalization Category	5-Yr Return	Excess Return Volatility	Expense Ratio
Bond Funds	Corporate Bond	Very Low	High	Low
Bond Funds	High Yield Bond	Very Low	High	Low
Blended Funds	Target Date 2000-2010	Very Low	High	Very Low
Blended Funds	Target Date 2011-2015	Very Low	High	Low
Blended Funds	Conservative Allocation	Very Low	High	Medium
Blended Funds	Target Date 2016-2020	Very Low	High	Low
Bond Funds	Long Government	Very Low	Low	Very Low
International Funds	Foreign Large Growth	Very Low	Low	Medium
International Funds	Japan Stock	Very Low	Low	High
Blended Funds	World Allocation	Very Low	Low	Medium

CONCLUSION

Basing mutual fund selection decisions based solely on age is a concept that not many in the investment community would deem feasible. Risk tolerance is ingrained in the psyche of the investing public. Even with its significant (and known) flaws, few investors would consider taking an academic step backward – and dropping it from consideration. Unfortunately, the attempted assessment of risk tolerance has only added to the confusion and complexity of investing. Would more Americans make the concise choice to invest if the selection process were simplified?

This study demonstrates that there is ample evidence for continued research on age-based solutions for investment decision-making as the results demonstrate that there may be an opportunity for investors/advisors to make mutual fund selection decisions based solely on age/risk capacity and return history. The majority of the findings are consistent with the generally accepted asset allocation decision that investors should slowly re-allocate their assets into fixed-income as they age. For instance, this study suggests that twenty-something investors may benefit from over-weighting a diversified portfolio in

large-cap blend and growth stocks, whereas octogenarians may wish to heavily weight their portfolios with corporate and government bonds.

This study adds value in that it aids investors in making specific asset class choices based on age alone. Complicated investor and advisor decisions (based on risk-tolerance) are simplified dramatically by basing decisions on the investor's age/risk capacity.

It is terribly beneficial that complicated investing choices be simplified. As more and more evidence is compiled that risk capacity is an adequate measure of asset allocation, more and more investors may have confidence that they are capable of making wise investment choices for themselves. This expanded comfort zone may increase individuals' motivation to invest – which benefits not only the individual investor – but society as a whole, as it may reduce dependence on underfunded social programs like Social Security. Taking the complexity out of investing is very likely to give Americans the confidence to invest – and invest wisely for their own futures.

AREAS FOR FUTURE STUDY

There are several obvious outliers in the results of the study. For instance, not many advisors would suggest that their retired clients heavily weight their portfolios in "Japan Stock" or even "Foreign Large Growth". It is recommended that this data continue to be compiled and analyzed to identify longer-term trends in asset class returns.

In addition, while helpful, this research is far from complete. More analysis needs to be completed to aid investors in making specific mutual fund selections rather than generalized asset allocation choices. While the asset allocation is the first step, this knowledge in and of itself does not unburden investors from being faced with thousands of mutual fund choices. Faced with these numbers, many investors may still be overwhelmed by the investing decision. Future research is needed to select the best funds for each asset class. While this study began to analyze items (like the Sharpe Ratio and the Expense Ratio), many more items must be analyzed.

In fact, this study, in its analysis of the standard deviation of the Sharpe Ratio suggests that specific fund selection choices may be even more important for some asset classes than others – as several asset categories had a fairly wide dispersion of the Sharpe Ratio. This suggests that there may be a sizable difference between the "good" funds and the "poor" funds within those categories. While asset allocation is a necessary and first step, it is suggested that additional beneficial research could be conducted on fund/security selection.

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APPENDIX A

TERMINOLOGY

The following provides descriptions for variables in our study. There variables are organized by category. The source for these variables is Wells Fargo Advisors and several other websites.

Variable General Information

Symbol - The identifying symbol assigned to the security by its exchange.

Description - The name of the entity that issued the security.

Category - The Morningstar category based on the underlying securities in each portfolio.

Availability - The mutual fund is available for online purchase.

Inception Date - The date the mutual fund was formed and became available for sale to unit holders.

Years Since Inception – The calculated number of years since inception as of November 2015.

Manager - The individual or individuals who are directly responsible for managing the fund's portfolio.

Manager Tenure - The length of time that the current manager has been the portfolio manager of the fund.

Open to New Investors - The fund is eligible for purchase by all investors, even by those who are not already existing investors in the fund.

Total Net Assets - The fund's total asset base, net of fees and expenses, used to describe a fund's size.

Asset Classes - A group of securities that exhibit similar characteristics, behave similarly in the marketplace, and are subject to the same laws and regulations.

Fund Family - The parent company that offers mutual funds.

Average Market Cap - A measure of the size of the companies in which the fund invests, calculated by multiplying the number of a company's shares outstanding by its price per share.

Fees & Loads

12b-1 - A common expense charged by many fund companies to cover certain marketing and distribution costs.

Admin Fee - What a mutual fund charges investors, deducted from the fund's returns, to pay for its day-to-day operations, including renting office space, printing prospectuses, and keeping records.

Management Fee - The costs shareholders paid to the investment manager of a mutual fund, typically calculated as a percentage of the fund's total assets, for management and administrative services over the fund's prior fiscal year.

Maximum Redemption Fee - An amount charged when money is withdrawn from the fund within a certain timeframe of the investor's initial purchase. The fee is meant to discourage market timers, whose quick movements into and out of funds can be disruptive. The charge is normally imposed on the ending share value, appreciated or depreciated from the original value. Charges are not imposed after the stated time has passed.

Sales Charge (Load) - For initial sales charges, or front-end loads, this figure is expressed as a percentage of the initial investment and is incurred upon purchase of fund shares. For deferred sales charges, also known as back-end loads or contingent deferred sales charges, the amount charged is based on the lesser of the initial or final value of the shares sold.

Transaction Fee - A fee that a mutual fund company charges an investor to make a transaction.

Ratings & Quality

Morningstar Rating - A ranking of publicly traded mutual funds by the investment research firm, Morningstar, ranging from one (poorest rank) to five stars (best rank) based on how well they've performed (after adjusting for risk and accounting for sales charges) in comparison to similar funds.

Morningstar Risk Rating: Morningstar Risk evaluates a mutual fund's downside volatility relative to that of other funds in its Morningstar Category. It is an assessment of the variations in a fund's monthly returns, with an emphasis on downside variations, in comparison with the mutual funds in its Morningstar Category. In each Morningstar Category, the 10% of funds with the lowest measured risk are described as Low Risk (LOW), the next 22.5% Below Average (-AVG), the middle 35% Average (AVG), the next 22.5% Above Average (+AVG), and the top 10% High (HIGH). Morningstar Risk is measured for up to three time periods (three-, five-, and 10 years). These separate measures are then weighted and averaged to produce an overall measure for the mutual fund. Funds with less than three years of performance history are not rated.

Morningstar Expense Rating: Morningstar evaluates a mutual fund share class's expense ratio relative to other funds that invest in a similar asset class and have similar distribution characteristics. Within each Comparison Group, a fund share class' expense ratio is ranked against peers using five quintiles (Front Load, Deferred Load, Level Load, No Load, and Institutional.) The Fee Level rating is objective, based entirely on a mathematical evaluation of a share class's expense ratio relative to similar funds. It is a useful tool for putting a fund's fees into context, but alone is not a sufficient basis for investment decisions.

Credit Quality - An average of each bond's credit rating, adjusted for its relative weighting in the portfolio, to inform investors of a bond portfolio's credit worthiness or risk of default.

Returns

Average Annual Total Return - The amount of money your mutual fund investment earns or loses, given as a percentage of the amount you invested, over a given period of time:

- YTD (%) - From the beginning of the calendar year to the "Data as of" date

- 1Y (%) - Over the past 365 days to the "Data as of" date
- 5Y (%) - Annualized over the past 5 years to the "Data as of" date
- 10Y (%) - Annualized over the past 10 years to the "Data as of" date
- Since Inception (%) - Since the creation of the fund to the "Data as of" date
- Alpha - A measure of the difference between a fund's actual returns and its expected performance, given its level of risk as measured by beta.
-

Ratios

Gross Expense Ratio - The fund's gross expense ratio is its annual operating expenses expressed as a percentage of average net assets and does not include any fee waivers or expense reimbursements the fund may have in place. A fund's current expense ratio may be lower or higher than the figure reported in the prospectus.

Sharpe Ratio - A risk-adjusted measure that uses the standard deviation and excess return to determine reward per unit of risk. The higher the Sharpe ratio, the better the fund's historical risk-adjusted performance.

Turnover Ratio - A measure of the fund's trading activity, computed by taking the lesser of purchases or sales (excluding all securities with maturities of less than one year) and dividing by average monthly net assets.

Expense Ratio - The fund's total operating, management, and administrative expenses as a percentage of the fund's net assets.

Volatility

Alpha - A measure of the difference between a fund's actual returns and its expected performance, given its level of risk as measured by beta

Beta - A measure of a fund's sensitivity to market movements. A portfolio with a Beta greater than 1.00 is more volatile than the market, and a portfolio with a Beta less than 1.00 is less volatile than the market.

Volatility - The change in price of an investment over a period of time.

Risk - The amount of price volatility in an investment, including the possibility of losing some or all of the original investment.

Standard Deviation - A statistical measurement, which depicts how widely a mutual fund's returns varied over a certain period of time. The higher the standard deviation, the wider the predicted range of performance, which implies greater volatility in the fund’s performance.

Duration - A measure of the sensitivity of the price (the value of principal) of a fixed-income investment to a change in interest rates, expressed as a number of years.

ALTERNATIVE THEORIES TO EXPLAIN BRITISH PETROLEUM'S RESPONSE FOR SUSTAINABILITY, ACCOUNTABILITY, AND REPORTING

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ABSTRACT

Formal environmental reporting is increasingly of interest to many groups of users of corporate information. The short run monetary considerations of catastrophic events appear to be fairly well developed and guided by financial standards and regulators, but the overall qualitative and quantitative long-run impacts are difficult to assess. Further, there can be a large variance in how reporting entities and other groups communicate information. While many companies may invest significant resources in environmental reporting, management response to crisis can appear overly defensive or directed away from issues at hand. British Petroleum's (BP) Gulf of Mexico oil spill demonstrates the case where management's response is far from congruent with its formal statement of environmental reporting. This paper explores alternative and sometimes competing theories of why information gaps develop. Specifically, does the management response attune itself in a posture of legitimacy, adapting activity to changing perceptions, or is the response guided by one or more stakeholder user groups? If dominant factors can be isolated, and if an appropriate vehicle for disclosure could be identified, would such information be useful to standard setters, regulators, and the general public?

ACCOUNTABILITY AND REPORTING

Evolving Requirements for Integrated Reporting

Currently many companies make a mandatory report about their financial activities in an "Annual Report" and their ESG (Environmental, Social, and Governance) activities in a voluntary "Sustainability Report". There is a growing demand from stakeholders for integrated reporting, or one report that combines the information from both. Integrated reports filed with Corporate Register, a European group that collects ESG reports, have grown from approximately 10 in 2004 to nearly 200 in 2009, to more than 20,000 in 2015 (Corporate Register, 2016). This new kind of reporting will expand the traditional financial reporting model by including some non-financial information and information related to ESG issues. A draft framework for this reporting was released September 12, 2011 by the IIRC (International Integrated Reporting Committee) (Monterio & Watson, 2011).

This movement is driven by a need to communicate information about enterprise activities to a broad range of stakeholders. These interested parties include the stockholders of the company as well as companies that want to partner with like-minded companies, socially conscious investors, government agencies, employees, and a variety of other groups impacted by the activities of the organization. At the same time, there is a growing need for one standard format to be used around the world for reporting financial and non-financial and ESG information.

In a parallel process, IFRS, or International Financial Reporting Standards, are under development, but are currently used in part or in total by a large number of countries. The Securities and Exchange Commission (SEC) in the United States accepts IFRS financial statements from listed foreign companies. These separate initiatives resulting in global, integrated reporting will radically change the practice of accounting and the nature of reporting in the future.

Focus on Environmental Reporting

Environmental information is one element of integrated reporting and there has been quite a bit of research examining required and voluntary disclosures. A wide variety of theories have been studied, but there is still a need to understand more about the environmental information reported by companies. Some of the new elements that will likely be required in integrated reporting might evolve from a number of voluntary reporting structures. The Global Reporting Initiative (GRI) has been a leader in this area. According to Corporate Register, “Companies looking for a global standard framework on which to base their CR (Corporate Responsibility) reports do not have much choice: it’s the Global Reporting Initiative or nothing" (Corporate Register, 2010) Study of the reporting by early adopters can provide insight to how companies are responding in the new reporting environment.

An Introduction to the Language of ESG

To better understand the literature, it is important to understand some of the language used in the field. There have been many terms used to describe voluntary environmental reporting during the last few decades. The newest language in the US is ESG, which will be used as the umbrella term for this paper for reporting that includes environmental, social, and governance items. Some authors to be cited refer to sustainability reporting, CSR (Corporate Social Responsibility), TBL (triple bottom line), citizenship accounting, or SA (Social Accounting), which is the ESG of their times. Social Accounting (SA) refers to reporting about the Social, Economic, and Environmental activities of an entity.

CR or Corporate Responsibility is another variation. The terms are used in this paper in context with the appropriate time. ESG reporting began in the early 1970s and has changed significantly during the last approximately 45 years. A number of theories have been proposed to explain ESG reporting. It is also important to know an “annual report” is required to be filed each year with the US Securities and Exchange Commission each year for companies that trade on US stock exchanges like the NYSE (New York Stock Exchange) and the NASDAQ. Some ESG information is included in annual reports and voluntary environmental reports.

SUSTAINABILITY

Definition of sustainability and non-sustainable

In 2006 the organization GRI declared (p. 6), "The goal of sustainable development is to meet the needs of the present without compromising the ability of future generations to meet their own needs (as cited by Caron & Turcotte, 2009). To be able to be enjoyed by future generations, the environment must be able to regenerate itself. Therefore 'non-sustainable" with regard to the environment can be defined as when the environment cannot meet the needs of present and/or future generations.

No Recent Research Analyzing a Non-Sustainable Incident

The choice to explore the impact of a non-sustainable incident on voluntary environmental reporting was influenced by the originality of the idea and the literature. An analysis of a non-sustainable environmental event was not found in the literature review. Originality is an important element in research design so that some new knowledge may result from the study. "(Originality) can mean making a synthesis that hasn't been made before; using already known material but with a new interpretation, bringing new evidence to bear on an old issue. . . (and) adding to knowledge in a way that hasn't been done before. (Phillips & Pugh, 1994, as cited by Silverman, 2005).

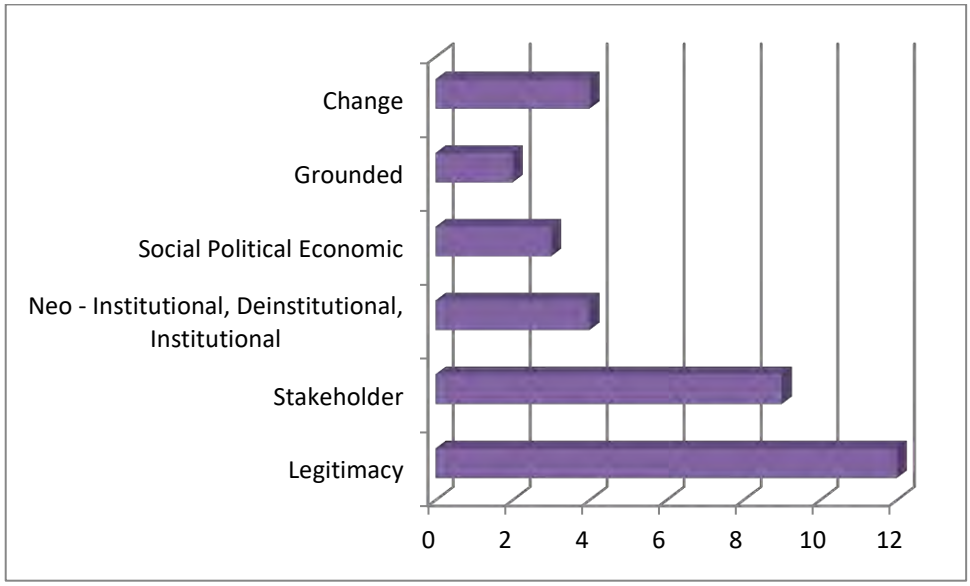
BP Oil Spill Is a Major, Non-Sustainable Event

BP is responsible for the Gulf of Mexico oil spill, the largest accidental ocean oil spill in the history of the world (Robertson, 2010), killing 11 workers. The event is "non-sustainable" in both a micro and macro sense. The spill resulted in BP setting up a $20 billion fund to settle issues relating to the spill (Robertson, 2010). Eventually, the final tab cost $53.8 billion dollars (Heavey, 2015). BP cannot incur such losses every year, the company would not be able to continue due to bankruptcy. In the big picture, the tremendous damage as a result of the spill has had a devastating impact on the ability of the area to sustain itself environmentally.

PREDOMINANT THEORIES IN THE LITERATURE

An examination of the literature will reveal the current understanding of these theories and the reveal the need for future study. From the literature review, twenty-seven articles were most closely related to the study of environmental disclosure. Table 1 charts the predominant theories found in the academic literature. Some articles explore more than one theory, so the theory total is larger than the number of related articles.

Table 1: Theories studied in the most relevant literature



Social, political, economic theory assumes there will be transparency in reporting, so is not the best match for this review. Institutional theories serve as the theoretical foundation for legitimacy theory. Legitimacy theory addresses the company's desire to "ensure their behavior is perceived to be legitimate" (Aerts & Cormeir, 2009). This theory is not a good fit for this paper as we want to examine the responses in terms of their alignment with interested parties. Legitimacy and stakeholder theories have been the most prevalent theories used to research environmental communications yet neither theory is very well-developed when applied to this reporting. Examining management response to a non-sustainable event using stakeholder theory will shed light on the responsiveness of reporting to stakeholders.

Stakeholder Theory Proposed to Explain New Economic Realities

Stakeholder theory was developed in the mid-1980s by business ethicists to formalize the recognition of rights of a number of parties (customers, suppliers, creditors, employees, the community, etc.) that have influence on or are influenced by a company. Some stakeholders are powerful, and can significantly influence the company. Those stakeholders with little to no power may be ignored. A corporation is a separate legal entity from its stakeholders. It has its own bank accounts and tax identification number. Stakeholder theory requires the company accommodate and balance the needs of its stakeholders. There is no comprehensive list of stakeholders as stakeholders and their needs would vary by company. Some BP stakeholders were impacted by the Gulf of Mexico oil spill. Is stakeholder theory useful in understanding voluntary environmental reporting after a non-sustainable incident?

Who are the Stakeholders in Stakeholder Theory?

In 1984 R. Edward Freeman first noted, "Stakeholders have risked financial, social, human or knowledge capital, or are affected by the actions of an organization" (Freeman, 2004). Primary stakeholders impact the organization's ability to continue and include customers, suppliers,

employees, government, and investors. Secondary stakeholders are groups who sway or are swayed by the organization. They are not involved in the business and business does not depend on them to continue. Secondary stakeholders include the media, special interest groups, competitors and critics. In a later work, Freeman and Reed (as cited in Zakhem, 2008, p. 51) propose one definition of stakeholder to include groups that are in concert with as well as opposed to the organization, "Any identifiable group or individual who can affect the achievement of an organization's objectives or who is affected by the achievement of an organization's objectives. (Public interest groups, protest groups, government agencies, trade associations, competitors, unions, as well as employees, customer segments, shareowners, and others are stakeholders."

CONFLICTS AMONG THE THEORIES

The Environment Is Not a "Stakeholder"

There is some theoretical weakness with the concept of the environment as a stakeholder. A more appropriate management concept might be stewardship. This is interesting in terms of stakeholder theory and the concept of sustainability. Sustainability involves the management of the environmental, social and governance policies of an organization, but not all of these elements directly involve stakeholders. The "environment" might be considered in terms of stewardship. To be sustainable, the environment must be able to continue to renew itself. Organizations must conduct their business to that the natural environment will continue to be enjoyed by future generations. The "social" involves some stakeholders with direct influence with the organization (labor, government, etc), and some who also require stewardship. The environment cannot speak for itself, and neither can children, mentally challenged and some elderly. So there are elements of stewardship for both environmental and social sustainability matters. One or more stakeholders would need to be stewards for both the environment and some social stakeholders. Most stakeholders have their own unique, distinctive purpose (culture, politics, economy), and it is the coordination of those purposes while appreciating the diversity that is the desired end result (Thompson & Driver, 2005 as cited by Zakhem, 2008).

Stakeholder theory and the law

Stakeholder theory has not been given a lot of credence by legal scholars because it is not directly related to the traditional legal branches of property, contract, or tort law. Fiduciary duty requires that managers put the purpose of the company above their own and others. However, there evidence of support in the law for stakeholder theory. The law supports the notion of many parties that have a claim on the organization. Employees, customers, creditors, suppliers, the community all have legal claims on the company. The law also indicates that shareholder interests are not the primary interest of the activities of the company. "Courts did not historically encumber corporate management with a fiduciary duty toward company stockholders in order to privilege shareholders vis-a-vis other stakeholder groups. Rather, it was designed to prevent self-dealing on the part of directors and top management that fell short of criminal behavior such as embezzlement" (Maren &Wicks, 1999, as cited by Zahkem, 2008).

Companies can legally consider the needs of many different stakeholders in managing the business. Laws protect consumers, the environment, and labor. Laws prioritize the interests of all stakeholders, and indicate that stockholder interests are not primary. The relatively young stakeholder theory is supported by legal theories and United States law. Owners of a company are not the only interested parties to a corporation and their interests are not considered first by definition. Legal foundations for stakeholder theory are still under development, but provide a basis for the application of stakeholder theory. ". . . it is possible to use an understanding of the law, in terms of legislation, judicial reasoning, and general jurisprudence, to defend stakeholder theory" (Radin 2002, as cited by Pava & Primeaux, 2002, p. 32).

Socially Responsible Investment Organizations (SRIOs) and Stakeholder Needs

Socially responsible investors have organized into groups to create their own "code of conduct" reflected the investment strategies employed by these groups. Technology, through the availability and use of computers and the Internet, has increased both the access to information and the ability to disseminate that information. Information can travel quickly and cheaply to a variety of interested parties, creating a network of stakeholders. The use of this information by groups concerned with responsible business practices drives higher expectations for quality socially responsible performance. Socially responsible investment organizations (SRIOs) are a relatively new class of stakeholder. In 1990 there were 12 social mutual funds in the US (Johnson & Brennan, 2002, as cited by Pava & Primeaux, 2002 p. 115) concerned primarily with NOT providing resources to products like weapons, alcohol, tobacco, gambling, and nuclear power.

With the increased information available through technological advances, SRIOs have evolved a more proactive approach to evaluating appropriate investments. SRIOs now consider the value of an organization's products or services as well as the company's contribution to the community, environmental stewardship, and socially advanced policies related to customers, employees and suppliers. By prioritizing social issues and providing a venue for discussion of the needs of various stakeholder groups across the globe, SRIOs provide important information to managers of corporations to help plan and direct their future business activities. GRI reports are a combination of information management wants to communicate to stakeholders and information stakeholders need from managers. With scarce resources, the most efficient and effective GRI presentation is the best outcome. Concise, comparable, consistent, complete, timely, transparent information is needed.

Stakeholder Theory and Society

Freeman again describes business and stakeholders operating together, defending both capitalism and the need for organizations to collaborate with others. "For the pragmatist, business (and capitalism) has evolved as a social practice; an important one that we use to create value and trade with each other. . . . The spirit of capitalism is the spirit of individual achievement together with the spirit of accomplishing great tasks in collaboration with others. Managing for stakeholders makes this plain so that we can get about the business of creating better selves and better communities" (Freeman, 2008, as cited by Zakhem, 2008. p. 86).

In 2002, Buchholz and Rosenthal (as cited by Pava &Primeaux, 2002, p. 10) coin the term "concrete growth". "Concrete growth is a process by which human beings, communities, and business entities alike achieve fuller, richer, more inclusive, and more complex interactions with the multiple environments in which they are relationally embedded. To speak of economic growth as enhancing quality of life while ignoring the enhancement of the community webs in which it is concretely embedded shows the abstract and non-relational understanding of the quality of life incorporated in the concept of economic development." The fact that authors have to create language to explain what is needed for corporations to function with full rights and responsibilities to society illustrates the complete separation of those rights and responsibilities currently. The authors call for a new code of conduct to be adopted by business people similar to such codes followed in the Professions of medicine, law, etc. This code would require corporations adopt a holistic approach to the environments in which they exist. There are elements concerning the oil spill that speak to BP's functioning as a member of a larger community.

The Rise of the Socially Conscious Investor

Social consciousness was a response to owners and managers with conflicting interests, as well as the interests of parties outside the company. During the 1980s, the need for addition information grew and various theories were proposed to explain social accounting. Capital market research continued and socially responsible investing emerged as an investment strategy. The demand for information related not only to labor, but for a broader range of topics arose. Concerns about the environment and other parties impacted by the activities of corporations arose. An awareness of stakeholders other than investors developed, as the need for information of various government agencies, other corporations, non-profits, and individuals grew.

At the end of the 1980s, a shift in thinking related to sustainability accounting occurred. Rather than merely reporting what the law requires about what has happened, there is a need to address what actions and information are needed by others outside the company. Over time the need for additional information not required by law became apparent. The law does not address all of the information needs of other public and private interested parties.

Profit Maximization Fails to Address a More Complex, Global Economy

Milton Friedman's classic view of economics described the responsibility of business as maximizing profit for shareholders while following the law. Business management has been narrowly focused on generating a return on investment to the shareholders. Maximizing shareholder interests as a strategy for company plans and goals has resulted in some negative outcomes for non-shareholder parties who are impacted by the company. This resulted in the growth of external pressure groups concerned about the environment, the rights of consumers, equal rights, and other issues. At the same time, business became an increasingly global activity. Business experienced unexpected losses due to externalities. A new conceptual framework for business operations that included the effects on parties outside the organization was needed to respond to challenges presented by a more complex, global business world.

A corporation is an organization of people, who have joined together voluntarily, for each to realize economic benefits. In a capitalist society, the corporation exists for economic purposes. But the corporation also impacts nature, and is a component of a larger society with its own cultural richness. By separating the economic goals of a corporation (production of goods and services) from the goals of the society in which it exists, the corporation is not focused on the long term best interest of society.

Halal (2000) summarizes the practice of governance during the last approximately 100 years (as cited by Louche & Idowli & Filho, 2010):

- 1900-1950: The profit-centered model focused on making the most income.
- 1950-1980: The social responsibility model recognized business has an obligation to contribute to meeting society's objectives while upholding society's values.
- 1980-2000: The corporate community model focuses on what the company should do to make the world a better place.

This analysis explains the evolution from the profit-centered business of the past to the more community-centered businesses today. Examining the voluntary disclosures of the company help us to understand how the company sees itself in terms of the larger community.

REALITIES OF THE MARKETPLACE AND ENVIRONMENTAL CASTRAPROPHES

Sole Focus on Free Market and Shareholder Value Recognized as Flawed Strategies

This weakness in the free market system was noted by Alan Greenspan when testifying before Congress in 2008 about the factors leading to the sub-prime mortgage crisis and the current recession. Alan Greenspan was chairman of the Federal Reserve Board in the United States for eighteen years until he stepped down in 2006. During his tenure, the United States had economic growth with low inflation. In his testimony, "a humbled Mr. Greenspan admitted that he had put too much faith in the self-correcting power of free markets" (Edmonds, 2008).

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Immediate Managerial Response to Gulf of Mexico Oil Spill

The BP 2009 Sustainability Review "defines sustainability as . . . contributing to a sustainable environment. . . and retaining the trust and support of the customers, shareholders and communities in which we operate". This stated policy is consistent with stakeholder theory. Comments by CEO Tony Hayward during the months of the spill (April, May, and June, 2010) do not appear to align with the company's stated sustainability values:
First, his statements downplay the impact of the non-sustainable incident:

- "The Gulf of Mexico is a very big ocean. The amount of volume of oil and dispersant we are putting into it is tiny in relation to the total water volume" (Snyder, 2010).
- "I think the environmental impact of this disaster is likely to be very, very modest," (Snyder, 2010).

These comments do not examine the incident in terms of contributing to a sustainable environment, but rather dismiss these concerns as not applicable to the current situation. Failure to correctly assess the damages that might result illustrate a lack of focus or concern for the environment, and the surrounding communities.

Second, he appeared to try to distance BP from responsibility for the non-sustainable incident, while agreeing they must clean it up. The incongruous quotes follow:

- "This was not our accident … This was not our drilling rig. This was not our equipment. It was not our people, our systems or our processes. This was Transocean's rig. Their systems. Their people. Their equipment" (Wray, 2010).
- "In terms of responsibility, I want to be very clear about this, this was not our accident." But it is our responsibility to deal with the leak and to clear up the oil (Politicol News, 2010).

In the Ernst and Young report on the 2009 Sustainability Review, they noted under Materiality that BP lacked depth in reporting about ". . .influencing the performance of business partners in relation to sustainability issues" (Ernst and Young, 2010). BP chose to partner with Transocean to drill for oil in the Gulf. Yet, the CEO pins the responsibility for the accident itself completely on the partner. He assumes responsibility for the results, for the clean up, but not for the incident itself which is inconsistent with an integrated set of sustainability practices.

Third, Mr. Hayward claimed to be victimized:

- "What the hell did we do to deserve this?" (Snyder, 2010).

This inward focus is contrary to the stated policy of retaining the trust and support of stakeholders. While BP represents itself as concerned about stakeholders and the environment, the way business is conducted appears contrary to the stated objectives. Based on this case, there appears to be a need for improved accountability.

MOVING FORWARD—AREAS TO RESEARCH

Why Will Voluntary Environmental Disclosure be Important in a Global Society?

As globalization progressed and communist countries fell, capitalism has been adopted in many forms. It is likely capitalism will be an important economic system for the future. Traditional capitalist economies do not require companies to incorporate environmental management goals in their plans. Voluntary reporting attempts to bridge this gap. Certification of voluntary environmental reports is growing and it addresses the criticism that such reports are window dressing whose purpose is to enhance the image of the company without any underlying substance to the claims in the report.

An international framework for voluntary environmental disclosures is complicated by differences in cultures and values, politics and law, and economics and financial structures. Legitimacy theory may not directly apply in countries where the laws and their enforcement are different. Different constituencies may be identified as "powerful stakeholders" (stakeholder theory) depending on the method of financing in the region and the extent of government intervention. Better analysis of reporting is possible when regional differences are understood. If there are regional strengths and weakness in the quality of reporting, transfer of knowledge across borders would be challenged. Studying stakeholder theories in historically non-Western countries would expand our understanding of international ESG reporting. In addition, there is precedent for voluntary frameworks evolving into international legal instruments. "Christian Aid (2004) for instance, documents how since 1997 thirty-five rich countries of the OECD have signed up to a convention that outlaws bribery of foreign public officials by businesspeople" (Thompson & Driver, 2005, as cited by Zakhem, 2008). Visser (2010) calls for research to fill the gaps in knowledge regarding international CSR which would result in the development of "Radical CSR" (p. xxvi). Radical CSR is envisioned to be a holistic, scalable and embedded model.

A transnational (Bostrom & Garsten, 2008) system for reporting about CSR matters is needed. The ISO 26000 standards were released in July 2010. This is the first set of voluntary guidance standards developed by ISO. These standards were developed by a group of international stakeholders and purport to integrate the needed elements of a world-wide system of ESG reporting (ISO 26000, 2011). The development of these standard demonstrates the growing international interest in a common set of guidelines and standards.

GRI – a New Conceptual Framework for Voluntary Environmental Reporting

The Global Reporting Initiative (GRI) has created guidelines for companies to report their results on human rights, labor, environmental, and other governance matters. More companies file GRI Reports than any other voluntary ESG report in the world. Companies file GRI reports "to report their activities . . . manage the impression given concerning their activities . . . and (improve) the bottom line profitability of the company . . ." (Crowther, 2004 as cited in Crowther & Bacchus, 2004). In 2015, over 24,000 companies filed a GRI report (GRI Sustainability Disclosure Database, 2015). The GRI guidelines are the most popular reporting mechanism because a wide range of international parties with an interest in sustainability reports contributed to the

development of the guidelines. As the world and its needs change, the guidelines must change, which complicates the task. The sustainability movement accelerating and reporting related to ESG issues is increasingly important. Having a variety of interested groups write the GRI guidelines serves three purposes. First, with a wide representation of interest groups, most or all of the important sustainability issues will be raised and addressed. Second, when world governments, businesses, social groups, educators, investment advisors, unions, and accounting work together to come to agreement on how and what should be reported, there is a greater likelihood that companies will voluntarily participate. And third, guidelines provide a format for measuring performance so organizations can demonstrate where their performance is weak, strong, improved or slipping.

Consideration of the communities impacted by a company, (stakeholder theory) may be reflected in the Sustainability goals and values of organizations. Sustainability practices do not always align with these goals and values. The evolution of Corporate Sustainability Reporting must continue.

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Track: Analytics, Business Intelligence, Data Mining, and Statistics — Carin Lightner-Laws, Clayton State University, *CarinLightner-Laws@clayton.edu*

Title: An Examination of Etsy Shops as Online Micro-manufacturers

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Abstract:

Micro-enterprises are organizations that have 5 or fewer employees including the working owner and make up 92% of 28 million U.S. companies in 2014 (a 5% increase from 2013). Micro-manufacturers represent a subset of these micro-enterprises, defined as organizations that primarily focus on creating unique items for niche clientele. Micro-manufacturing examples include tailored clothing, handmade artisan goods, or made-to-order artwork digital artwork, among others. With limited resources and training, micro-manufacturers must identify their clientele and find markets for their products. Fortunately, the Internet has increased the reach of micro-manufacturers while also creating a thriving marketplace for customized products. As a result, prominent micro-manufacturing platforms like Etsy have seen significant growth in recent years. According to Etsy.com, as of 2015 they facilitated $2.39 billion in merchandise sales by supporting 1.7 million active sellers and 26.1 million active buyers. The rise of Etsy represents a significant opportunity for micro-manufacturing, yet hurdles remain for these organizations. Limited resources, digital platform choice and investment, and avenues for sustained competitive advantage are just a few of the challenges that these organizations face. Adding to the problem, little research exists that can inform the competitive actions taken by micro-manufacturers looking to compete in digital platforms like Etsy.

This study aims to fill this gap. Using cross-selling platform marketing as a theoretical base, we examine data from Etsy as a way to examine real-world actions in support of theoretical propositions. Specifically, we answer two fundamental questions: “What are the characteristics that describe successful micro-manufacturing organizations?”, and “What micro-manufacturing actions are most associated with increased item sales price in online environments?”. In answering these questions, we collected data on all the actions taken by 1386 Etsy shops and their customers over a period of three months. Empirical analysis of this data is used to develop a framework meant to demonstrate how micro-manufacturers utilize the scaling opportunities of online marketplaces in order to increase their customer base and support their selling activities. Results of this study show that micro-manufacturing sales success is highly dependent on engaging in the right types of activities in the right amounts.

Takeaways from the study will be of use to both research and consumer settings. The study adds to data analytics research by highlighting the knowledge developed through insights gained from mining digital data over a period of time. Today's consumers are becoming more comfortable with online

commerce, which recently has begun to outpace traditional in-store shopping. Traditional retailers are being encouraged to innovate in their product offerings in order to differentiate themselves from competitors and gain a competitive advantage. Micro-manufacturers have much to learn (and teach) about how to carve out an online space in the increasingly crowded electronic marketplace.

AN EXERCISE TO INTRODUCE MEMORANDUM COMPONENTS IN A QUALITY MANAGEMENT LECTURE

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ABSTRACT

This paper presents an exercise to introduce memorandum components in the quality management module of an undergraduate operations management course. Students are asked to role-play an operations manager by writing a memorandum to request information from a co-worker. Then students are asked to identify the following components in their memorandum: audience, problem statement, and follow-up action. Lastly, students are given an example of a memorandum with an appropriate recipient, statement of the problem, and request for specific information.

INTRODUCTION

Written communication and ethical understanding are important skills for business students to develop. The Association to Advance Collegiate Schools of Business (AACSB) accreditation requires general skills areas that include effective written and oral communication, ethical understanding, and analytical thinking (AACSB, 2016). In Operations Management, the subject of quality management requires an ethical commitment to managing operations such that products and services meet safety requirements and advertising claims. Operations managers seek to design and manage systems to minimize preventable mistakes by working with their colleagues. Critical to this collaborative effort is professional communication with co-workers to request information, analyze problems, and lead continuous improvement.

We evaluated quality management chapters in seven operations management textbooks, only to discover that they did not contain examples of business writing, such as a professional memorandum. As a result, we developed an active learning exercise to use within our quality management module that introduces memorandum writing in an operations management context. Our exercise requires students to think about which personnel should be involved in working on a quality problem with ethical implications, write a memorandum, identify the components of the memorandum, and read an example of a memorandum. The benefit of this instruction is that it directs students to consider and practice professional communication while they are learning about quality management. Furthermore, this technique may be used in any business discipline or even other academic disciplines.

LITERATURE RELATED TO OUR WORK

Operations management textbooks were evaluated for examples of professional communication in the quality management chapter. Of the seven quality management chapters evaluated (Chase, Jacobs, & Aquilano, 2006; Collier and Evans, 2015; Heizer, Render, & Munson, 2017; Krajewski, Ritzman, & Malhorta, 2013; Nahmias, 1997; Russell and Taylor, 2000; Schroeder, 2008a; Schroeder, 2008b), none contained examples of memorandum communication between industry personnel related to quality management. Two texts included dialogues between co-workers in specific case studies at the end of the chapter (Collier & Evans, 2015, p. 341; Chase, Jacobs, & Aquilano, 2006, p. 340). Two texts alluded to the importance of communication. Nahmias (1997, p. 690) described an employee's frustration when he had difficulty convincing his co-workers to try his plan. Russell and Taylor (2000, p. 93) describe the importance of "clear lines of communication to address quality problems."

The absence of memorandum examples in operations management textbooks reveals an opportunity to add an important element of business communication to the succinctly described quality management problems. The common textbook focus for quality management is on total quality management concepts and calculating performance metrics related to customer satisfaction, process capability, or production stability. Welborn and Singer (2013) lament that operations management course content often does not help students adequately apply what is taught. Kuh (2008) identifies writing across the curriculum in areas such as quantitative reasoning as a high impact educational practice. Using the high impact practice of written communication in the context of quality management is described next.

METHOD

An Active Learning Exercise in Memorandum Writing

Specifically, this paper introduces an active learning exercise about writing a memorandum in the quality management module of an introductory undergraduate operations management course. The business context is a fictitious healthcare provider, Sun Hospital. The operations manager at Sun Hospital seeks to improve quality by identifying the most frequent preventable mistakes. The exercise requires students to write a memorandum, read a memorandum, and answer questions about both memorandums. The teaching instrument is provided in the appendix.

When given Handout 1 with initial information for the open-ended Sun Hospital problem, students may not know where to start. Guided discussion questions help students start thinking about this open-ended problem. To create a class list of personnel who should be involved in the problem, students are asked to think about who in an organization tracks the outcome of the organization's performance. For the class list, students might identify individuals in human resources, marketing, accounting, customer service, or quality, as well as nurses, physicians, a chief resident, or a chief of surgery.

Students are asked to draft a memorandum to the individual they select. Students may hesitate to fill in the "Student's Memorandum" template provided in the appendix; they may

need about ten minutes to draft a brief memorandum. They can be encouraged to select a person from the list their class just created and to write a query for information that may be used to identify preventable mistakes.

After students have written their memorandum, they are given Handout 2 to guide them through analyzing their memorandum. Students must identify the recipient of their memorandum. Next, students are asked to identify the problem they described and the follow-up action they requested. Many students realized they had elements missing from their memorandum.

Next, students are given Handout 3 and asked to read the "Example Memorandum" from Operations Manager, Ms. Kim Patel. Then students are asked to identify the recipient of "Example Memorandum" from Operations Manager, Ms. Patel, as well as the problem Ms. Patel describes, and the follow-up action Ms. Patel requests. In "Example Memorandum," Operations Manager Ms. Patel is concerned about preventable mistakes and requests that Mr. Lamar Jackson, VP of Quality, identify the preventable mistakes at Sun Hospital and their frequencies.

DISCUSSION

Curricular Implications

The seven quality management chapters reviewed lacked examples of written professional communication in their presentation of quality management principles. Reflection on course materials including textbooks and lecture materials revealed that students had not been given writing experiences in the discipline specific context.

To address this problem, we developed an active learning exercise for a quality management scenario that required writing a memorandum, reading a memorandum, and answering questions about the memorandums. The exercise in the appendix helps students gain insights into the different personnel who can be involved in gathering data for problem solving as well as an internal memorandum communication. The memorandum presented in this paper was developed for a class exercise that provides for both personal student reflection and class discussion about the important components of a memorandum.

Benefits of the Study

This high impact practice to integrate writing, reading, and discussion of professional communication for a business scenario can help students become more engaged in learning. As students read through the business memorandum presented here, they had the opportunity to identify an audience for professional communication and employee roles. They also studied an example of a problem description and follow-up request. Our goal is to help students gain richer insights into how to identify the appropriate audience, develop a team approach to identify a problem, and request follow-up actions using professional writing that can support quality management.

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APPENDIX

Handout 1:

Ms. Kim Patel, the operations manager of Sun Hospital, is reflecting on recent news about a young patient who died from a healthcare associated infection caused by a preventable mistake. She wants to direct her organization, Sun Hospital, to reduce preventable mistakes.

Who in an organization might track the number of preventable mistakes?

_____

_____

_____

In the space provided for "Student's Memorandum," draft a memorandum from Ms. Patel to request the frequency of each type of preventable mistake.

Student's Memorandum

DATE: _____

TO: _____

FROM: Ms. Kim Patel, Operations Manager, Sun Hospital

RE: _____

_____

_____

_____

_____

_____

_____

Handout 2:

1. Who is the recipient in your "Student's Memorandum" from Ms. Patel? _____

2. What problem does Ms. Patel briefly describe in your "Student's Memorandum"? _____
_____

_____

3. What follow-up action does Ms. Patel request in your "Student's Memorandum"? _____
_____

_____

Handout 3:

Example Memorandum
DATE: March 22, 2016
TO: Mr. Lamar Jackson, VP of Quality
FROM: Ms. Kim Patel, CEO
RE: Identify our preventable mistakes

The recent news about the young patient who died from a healthcare associated infection caused by a preventable mistake prompts me to ask you to identify preventable mistakes and their frequencies over the past year at Sun Hospital.

1. Who is the recipient in the "Example Memorandum" from Ms. Patel? _____

2. What problem does Ms. Patel briefly describe in the "Example Memorandum"? _____
_____

_____

3. What follow-up action does Ms. Patel request in the "Example Memorandum"? _____
_____

_____

An Interdisciplinary Approach to Cybersecurity Curriculum

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Abstract:

Current media has many stories of cyberattacks on the global financial system. The system is inter-related and inter-dependent. Attacks on a single institution in one country can have major economic impacts throughout the world.

In the United States, a voluntary risk-based Cybersecurity Framework was developed for all industries. The Framework is a set of industry standards and best practices to help organizations manage cybersecurity risks. The Framework was a collaborative effort between government and the private sector. The Framework avoids placing additional regulatory requirements on businesses.

The Framework recognizes that organizations in various industries will continue to have unique risks – different threats, different vulnerabilities, different risk tolerances, and implementation of the best practices set forth in the Framework will vary. The Framework is a living document that is updated and improved as there is feedback on its implementation.

We used the framework to design a curriculum and develop courses for a doctoral program in Cybersecurity. The courses are spread among the areas in the Cybersecurity Framework, and course competencies and learning objectives are derived from specifications in the Framework.

This paper will describe how we plan to bring interdisciplinary aspects into the curriculum, while following the framework. In this paper, we focus on coursework in Accounting and Finance. We also prescribe a series of courses in research for cybersecurity, in which students could focus on Accounting and Finance issues if that is a career path they plan to take.

AN OVERVIEW OF JEFF SELINGO'S *THERE IS LIFE AFTER COLLEGE* AND IMPLICATIONS FOR BUSINESS FACULTY

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ABSTRACT

Former Chronicle of Higher Education editor Jeff Selingo has struck a nerve with parents, students, and higher education professionals in his book *There is Life After College* (2016). The book analyzes student academic and pre-professional attributes while in college and categorizes three types of post-college 20-somethings: Sprinters, Wanderers, and Stragglers. This presentation will offer a short summary of the book's main points and generate discussion about ways that Business Schools can inspire more Sprinter-like behaviors and reduce the population of Stragglers.

The book draws from Selingo's own research in traveling with and interviewing many college students and young professionals. It also ties back to the existing body of knowledge and current state of research in higher education. Topics include behaviors that maximize future earnings, the best elective courses to take, three good reasons to take a gap year, why employers are redirecting their hiring focus toward interns, the effect of college debt on entrepreneurship, the effect urban locations have on professional success, entrepreneurial models other than college for 18-22 year olds, and where successful job leads are most likely to come from.

All business faculty need to know the basics behind Selingo's ideas in order to advise students, address parent concerns, and design programming to coach students to become confident Sprinters rather than letting them wander aimlessly or straggle helplessly. This presentation will inform participants and generate ideas to improve success on each campus.

Analysis of Significant Success Factors in YouTube Channels

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ABSTRACT

Social media, such as YouTube, has become a profession for thousands of average people, allowing them to earn as much as four million US dollars annually. In this study, we will be proposing a new problem called the channel assignment problem, used to determine how YouTube channels can maximize their profits. YouTube provides a platform for average people to create videos on various topics and connects with people from around the world. The social media site also matches advertisers with YouTube channels based on channel topics, video titles, and video "tags." Channels that receive high numbers of viewers and subscribers tend to be matched more with advertisers and receive higher advertisement revenue per advert played on those channels. Sometimes contacted directly for sponsorships from online companies looking to advertise on successful channels. In this study, we will use statistical analysis as our methodology to determine various parameters of the channel assignment problem, such as country of origin, the theme for videos on channels, and anonymity, that cause channels to obtain high numbers of viewers and subscribers, which generate high levels of revenue.

Keywords: YouTube, Channel Selection, Statistics, Advertising, Revenue

Analyzing Inventory and Primary Resources in the Supply Chain

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Abstract

Inventory is recognized as an essential asset and a key driver in supply chain management. Inventory accounts for more than 50 percent of the current assets in many companies. Several other resources also occupy significant roles in the supply chain. Coordination of inventory and other resources is a central activity for supply chain managers. As a result, a growing area for supply chain careers is the job title of supply chain analyst. The purpose of this paper is to discuss the need for further coverage of supply chain analytics within existing supply chain programs. With a limited number of courses, it is critical to allot sufficient time to include appropriate analytics topics. Some initial examples in one supply chain program will be presented.

Introduction

A recent web search for the job title "supply chain analyst" returned 6,990 results (Indeed.com, 2017). A similar search for "supply chain management" jobs returned 40,794 results nationwide (Indeed.com, 2017). The number of supply chain analyst postings is a significant percentage when compared to the more general search. Businesses are relying on a wide range of data sources and that has elevated the importance of supply chain analyst among the various supply chain roles in many companies.

Here is a basic job description for "supply chain analyst" from one online source:

"Gathers data and conducts analysis with the goal of improving the organization's supply chain operations. Identifies underperforming areas in the supply chain and may suggest improvements or resolutions to problems. May assist in the negotiation of supplier contracts or service arrangements. Typically requires a bachelor's degree or equivalent and at least 3 years of experience in the field or in a related area. Familiar with a variety of the field's concepts, practices, and procedures. Relies on experience and judgment to plan and accomplish goals. Performs a variety of complicated tasks. A wide degree of creativity and latitude is expected. Typically reports to a manager or head of a unit/department" (Salary.com, 2017).

The main objective of supply chain management is to coordinate the flow of materials, information and funds across the entire supply chain from supplier to manufacturer to wholesaler to distributer to retailer to final customer. The ultimate goal of the supply chain is to match supply with demand. The multiple stages in a supply chain require substantial amounts of inventory be held at different points to support operations at the various partner facilities or provide acceptable customer service levels. Many companies have significant amounts of money tied up in inventory throughout the supply chain. Given the importance of inventory, the study of supply chain management must include a thorough study of

inventory management. But focusing on inventory alone is clearly inadequate coverage of the full spectrum of supply chain activities and resources.

Literature Review

Two seminal articles serve as the base of the literature for supply chain management. The articles mentioned here provide the foundation for many publications including journal articles and textbooks. Johnson and Pyke (2000) provide course outlines for early courses from eight highly regarded universities at the leading edge of supply chain academic programs. The authors develop their own framework for their vision of how supply chain management should be taught (Johnson and Pyke, 2000). Extracting the main supply chain resources from the Johnson and Pyke framework results in the following:

- Facilities (covered as "Location")
- Inventory
- Marketing and Distribution Channels
- Customers
- Suppliers
- Information and Information Technology

The second article by Mentzer et al (2001) is approaching 3,800 citations according to Google Scholar which indicates the importance of this article in the supply chain literature. Researchers have cited Mentzer et al (2001) at a high frequency as a trusted authoritative source for defining and describing supply chain. The working definition they offer is as follows:

"…a **supply chain** is defined as *a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer"* (Mentzer et al, 2001) {emphasis from orginal}.

And:
"…**supply chain management** is defined as *the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole"* (Mentzer et al, 2001) {emphasis from orginal}.

These definitions lend support to our earlier observation about coordinating inventory and other resources being central responsibilities of supply chain managers. The definitions also imply the use of data and the need for supply chain analytics to make business decisions and to assist supply chain coordination.

Beyond supply chain management, we look to the literature on data analytics. Davenport (2006) provides a great overview of the application of analytics in a wide range of business applications. He also includes several supply chain examples and lists specific supply chain activities where analytics have been deployed (Davenport, 2006). He provides a description and exemplar companies for analytics related to supply chain as follows:

Description – "Simulate and optimize supply chain flows; reduce inventory and stock-outs."
Exemplars – "Dell, Wal-Mart, Amazon" (Davenport, 2006).

Of course, these are well-known examples for most faculty in the Operations and Supply Chain field. Analytics can be valuable and needs to be more accessible for all types of businesses.

Supply Chain Analytics

The term data analytics (or business analytics) has very different meanings for different people from different functional backgrounds. Customer data tends to be the dominant focus of many business intelligence and data analytics endeavors. While the customer is clearly important in supply chain management, there are many other aspects that need to be analyzed.

One leading business analytics textbook does not list "inventory" in the Index for the book (Camm et al, 2014) and there are no examples or problems that address "inventory" explicitly. The only closely related topic (re: inventory) is a Linear Programming example and subsequent problems that address production, demand requirements and departmental capacity constraints. The book's coverage of "business analytics" was not intended to provide thorough coverage of "supply chain analytics."

The following sections highlight the efforts in two courses to incorporate supply chain analytics topics. A third course offered as a Special Topic also provided an opportunity to deliver supply chain analytics material. This initial effort has also attempted to provide a broad coverage of analytics for different supply chain elements.

Inventory

The following topics are introduced in Operations Management and covered more extensively in the Supply Chain Management course. The primary concepts covered include:

- Economic order quantity (EOQ)
- Reorder point and safety stock calculations
- Cycle service level
- Inventory costs
    - Carrying costs
    - Average inventory costs
    - Ordering costs (or setup costs)
- Inventory value and ABC analysis
- Linkages between supply chain partners o
    - Supplier
    - Manufacturer
    - Distributer
    - Retailer
- Bullwhip effect

These topics are presented in a variety of formats including lecture, quizzes, problem sets, exercises and case studies. In the second course, Supply Chain Management, greater emphasis is placed on the cost and performance impacts of decisions such as safety inventory policies.

Primary Resources

The Supply Chain Management course and the Special Topic course afford the opportunity to incorporate analytics that focus on other primary resources such as – facilities (factories and distribution centers), suppliers, company fleet vehicles, the workforce and others. There are a limited number of examples and problem sets in some of the textbooks currently available. In every case, the books have not been written with "supply chain analytics" as the main topic so the instructor must be persistent to develop or find good supplemental materials.

Essentials of Business Analytics by Camm et al (2014) is the textbook for the Special Topics course on Supply Chain Analytics. Using this book required careful selection of the materials covered and the problems that were assigned. Ten out of the twelve chapters from the book were used and supplemental materials were used from several sources. The main topics covered are as follows:

- Descriptive Statistics
- Data Visualization
- Linear Regression
- Time Series and Forecasting (with emphasis on Seasonal)
- Data Mining
- Linear Optimization
- Decision Analysis (uncertainty, risk, and tree diagrams)

The supplemental materials included an overview of Data Science and additional material on Machine Learning and Data Mining utilizing Provost and Fawcett (2013) as the supplemental source. Future offerings of this course will incorporate more supplemental materials to sharpen the focus on supply chain analytics.

Summary

This paper has discussed the growing demand for supply chain analysts as the motivation for incorporating more explicit supply chain analytics topics in existing supply chain academic programs. A very brief outline of analytic topics covered in two regular curriculum courses and one Special Topic course are also presented.

One proposition of this paper is that the major shortcoming of business analytics is the myopic focus on customer data. Supply chain analytics should include customer data as one element but many other resources must be analyzed to enhance supply chain performance. Inventory is a very significant resource to be included along with other supply chain resources including facilities, suppliers, distributors, vehicle fleets, employees along with many others.

This paper is a beginning step along the path that leads to a more thorough coverage of supply chain analytics. Additional future steps will include developing supply chain cases and data sets which will allow students to practice analytics across all phases of the supply chain.

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Antecedents of Job Satisfaction and Employee Engagement: Mediating Role of Cognitive and Affective Response

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Statistics and Quantitative Methods, MBAP 6011

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Abstract

Every day, it is a normal process for individuals to go to their place of employment. Most individuals who work full time, works an average of 40 hours per week within a 5 day period, which breaks down to working 8 hours per day. That calculates to working over 2,000 hours per year. Due to this, working individuals are taking minimal vacations and time away from work, (Johnson, 2014) and end up working longer than they actually plan. Different studies have shown that more American employees are spending more time at their jobs than ever before.

Since employed individuals spend such a significant level of time in the workplace, they should enjoy their jobs and have a sense of fulfillment; a sense of work engagement and job satisfaction. This study utilizes structural equation modeling with a sample size of 180 respondents using a questionnaire. Seven scales was used including, compensation, respectful treatment, job security, affective response, cognitive response, job satisfaction and work engagement. Structural equation modeling is used to evaluate the hypothesis. Findings indicate that antecedents of job satisfaction and work engagement have a positive relationship with affective response.

KEYWORDS: ***Satisfaction, Employee , Affective , Cognitive***

Introduction

It is important for organizations to understand the needs of their employees so that they can better suit them, which could have a positive effect on the business itself. As previously mentioned, needs differ for each individual and over periods of time. For instance, compensation and pay were once the number one factor for workers to have a sense of job satisfaction and while it is still a top contender; relations in the workplace seem to have become more important in recent years. It is very important for employees to have respectful relationships with their co-workers and supervisors, which will result in a harmonious work environment. In a study conducted by the SHRM (Society for Human Resource Management), 90% of the individuals surveyed stated that maintaining respectful relationships with coworkers and management was a top contributing factor in their levels of job satisfaction. When studying the effects of job satisfaction in employed individuals, research has focused on two domains that are prime indicators to how well an employee feels and perform at their job.

It is important to consider the emotional responses of employees towards their jobs because humans tend to be emotional beings. The way an employee feels about their relationships at work and its effect on their emotions is called the affective domain. It has been determined that an employee's emotional response to their job can have an effect on how they perceive their work environment (Rogel, 2014). For example, if an individual feels that there position and ideas are valued by the company, they will have a positive perception of the

workplace versus an individual who does not feel appreciated and that they have no room for growth within the organization.

The next domain focuses on an individual's thought process, perceptions and beliefs they have in regards to an organization they work for. This is commonly referred to as the cognitive domain. For example, if an employee feels that they are being treated unfair and not receiving the same opportunities that are given to other employees, it can make them believe that the organization is showing bias. Once an individual starts to develop negative connotations about their place of employment, it can result in decreased levels of job satisfaction and work engagement. While there are various reasons why an employee may think that an organization is being biased, it is important for employers to make sure that top management is not involved in any level of favoritism or bias.

The top three factors that contributes to employee satisfaction is 1)how they perceive think or believe about the organization 2) how they emotionally feel about the organization and 3) how fulfilled the employee is while working at the organization. Other reasons that impact levels of job satisfaction are the amount of pay received and being treated respectfully within the organization. Additionally, people want to feel secure with the company that they work for. Focusing on the above mentioned factors will help increase work engagement and job satisfaction, which will lead to organizations obtaining employees who are happy. When employees are happy, it will show in their work. This will result in low turnover, increased work performance and satisfaction.

Literature Review

More and more organizations are seeking ways to keep turnover down and maintain hard working employers. Obtaining employees who are happy, hard- working and willing to exceed expectations on a daily basis gives organizations a competitive advantage within the job market (Shaama, Al-Rabayahh, and Kwasaneh, 2013). So it is imperative that organizations take into consideration what factors will help contribute to an employee's level of commitment. A study was conducted by Rayton and Yalabik, 2014, arguing that job satisfaction plays a mediating role between psychological contract breach and work engagement. Employers are expected to fulfill promises to their employees; if the employees are satisfied they will have an increasing level of engagement. The following sections will explain the antecedents of job satisfaction and work engagement and their relationship to cognitive and affective response.

Job Satisfaction

The extent to which an employee feels satisfaction towards their job is considered job satisfaction and it can include different factors such as teamwork, availability of resources, personal attitudes and the supervisors follow up to improve the overall level of satisfaction that one experiences. (Abraham, 2012). When an organization takes care of the needs of their employees and respect their morals and values, employees will be more satisfied in their jobs which in turn will affect how they perform in the workplace.

There are several factors that influence one's overall sense of job satisfaction. However, according to a survey conducted by SHRM (Human Resource Professionals), the top five contributing factors to how satisfied an employee is; are being respectfully treated in the workplace regardless what level of position and/or power one holds. Respect was rated very important based on a study conducted in 2014 in which 72% of employees found this to be a substantial element. Furthermore, the level of trust that is exhibited between senior management and employees was ranked second as being one of the most important contributing factors to levels of employee satisfaction, with 64% of employees rating this as important. It is interesting to notate that the top two components that influence job satisfaction are those that promote a healthy and positive relationship between an organization's employees and management team.

As can be expected, benefits are included as being one of the peak contributing components of overall job satisfaction. In fact, this was almost just as equivalent as having healthy relationships between employees being that over 60% of individuals estimated benefits as being highly important. Another contender was compensation/pay, with 61% of people reporting this to be a high priority. Lastly, people want to feel secure at their place of employment, thus, in a study conducted during 2014 over 55% of employees surveyed considered their level of job security as being an vital factor in their levels of job satisfaction. Although job security is important, they are many other factors that are deemed more critical than the importance of job security due to the current economy. (Society for Human Resource Management, 2014)

Along with this, job satisfaction is also affected by an individual's mood and emotions, genetics, personal characteristics, personality and their ability to work in a group (Shamaa, Al-Rabayahh, and Khawsawneh, 2015). All of these individual factors play a role in how an employee views their place of employment. Different studies done on job research have important implications for organizations in regards to increasing resources and finding different ways to help provide their employees with work/life balance, and promote engagement and satisfaction which in turn will affect the overall atmosphere of the organization.

Since work engagement and motivational behavior are so closely related (Salanova and Schaufeli 2008), we see that the cognitive response of employees can be increased as levels of motivation are increased in the workplace. A comfortable work environment leads to a level of comfort and pleasure within the homes and communities of employees; they are much more pleasant than unhappy workers. The motivation for recruitment is increased as a result of

pleasing work engagement. Workers tend to encourage future employees that the company is a wonderful organization to work for.

Employee Engagement

The term employee engagement explains how employees become more involved with their organization in attempts to help increase levels of productivity, promote innovation and increase employee retention based off of their cognitive and affective response (Sham, Al-Rabayahh, and Khawsawneh, 2015). Employee engagement is important to any organization that wants to run an efficient and profitable operation. Organizations who want to be successful primarily focuses on hiring employees who will be committed and loyal, due to the fact that these type of employees will show their dedication to the organization (Deepa, et al, 2014). By obtaining loyal and committed employees, organizations are helping to reach their goal of making a profit. Therefore, it is essential that organizations obtain employees who are dedicated to improving the company performance goals along with increasing revenue. Different research studies have been able to link how engaged an employee is to work performance, how satisfied the customer base is, work productivity, turnover rates and how much support the organization has. (ADP Research Institute, 2012).

According to Kahn, work engagement is associated with three psychological conditions: 1) meaningfulness (how well do one feel that they contribute to the success of the organization, 2) safety (how secure an individual's feel while at work, and 3) availability (how accessible are the resources that employees need). When an organization has engaged employees, they work with a sensation of happiness and take value and pride in their job. Employees who are engaged are also more apt to put more effort into their work, and go above the call of duty. When employees are disengaged, and employers fail to meet the needs of their employees it can lead to employees becoming confused, depressed, or even angry with the organization as a whole.

Hypothesis & Theory

This study will help examine the effect that different antecedents of work engagement and job satisfaction have on affective and cognitive response. The following hypotheses were formulated and tested utilizing SPSS regression analysis, Anova, EFA, CFA, structural equation modeling, Cronbach Alpha and validity tests:

Cognitive response is a variable of job satisfaction, and compensation is as well. Compensation is a factor considered at the beginning stages of a job. When employees are compensated fairly, their beliefs and perceptions about an organization are noble. Barton (2002) proposed that companies should focus on monetary awards along with employee salaries due to

the major impact it has on how motivated and committed an employee is. Motivation and retention in the workplace are increasing values when employees' cognitive attitudes are pleased. When employees notice their theories about organizations are supported with compensation, organizations are more likely to have a high retention rate.

The cognitive process helps guides organizations to understand how satisfied their employees are; based on a person's beliefs, perceptions, and theories in regard to the organization they work for. Thus, it is important for organizations to understand the needs of their employees so that they can better suit them which could have a positive effect on the business itself. As previously mentioned, needs differ for each individual and over periods of time. For instance, compensation and pay were once the number one factor for workers to have a sense of job satisfaction and while it is still a top contender; relations in the workplace seem to have become more important in recent years (Society for Human Resource Management, 2014.) In a survey conducted by SHRM, 90% of employees ranked respectful treatment as being a vital component of how satisfied they were at their jobs (Society for Human Resource Management, 2014). Based on the information above the following hypotheses are tested:

H1: Compensation directly affects cognitive response

H2: Respectful treatment directly affects cognitive response

Job security is defined as how individual feels when they are confident that they are irreplaceable at their place of employment, or there is a very small chance that they will become unemployed. As long as an individual feel secure, their perceptions and beliefs about their job will be great, but as soon as they feel a threat to their sense of livelihood the way they perceive their job can change. For example, when organizations choose to bring in temporary workers, a lot of employees feel threatened. The reason for this is most individuals believe that the organization is obtaining candidates who are qualified to do the job and may offer them a full time position in the future (Bauer & Truxillo, 2000). When employees feel that their job security is threatened it produces a lack of trust between the employees and the organization and can lead to "perceived job security", which is a cognitive state of mind where employee's expectations of staying at the organization vary (Pearce, 1998). Overall, job security plays a major role in how individuals perceive their place of employment.

The affective response in the workplace focuses on the emotional response of employees to notions of organizations. Compensation is expected when working for companies. "Roberts (2005) conducted a study on recognition and rewards have a direct correlation to employee job satisfaction. The data collected from the survey proved that compensation is one of the main factors that satisfies and excites employees (Yaseen 2013). When employees have exciting attitudes about work, the overall culture of the organization is desirable. When the culture of the workplace is desirable, the attitudes throughout the organization are pleasing. Employees are

happy when they are paid fairly and equally according to levels of ability. This is a direct result of having fair and desirable compensation. Based on the information above the following hypotheses is being tested:

H3: Job Security directly affects cognitive response

H4: Compensation directly affects affective response

Respectful treatment is a dependent variable of affective response in the workplace. Since affective response considers the attitudes and emotions of employees, respectful treatment is of high importance. The main factor that contributed to employee job satisfaction in 2014 was how well employees felt they were respected and treated in the workplace. Over 70% of employees surveyed, felt that being treated with respect was a very vital component to job satisfaction. (Society for Human Resource Management, 2014). Employees feel safe when they are treated with respect in the workplace and a level of trust between executives and other employees is built. This respectful treatments leads directly to good attitudes in the workplace and the affective response of employees is contagious. Respectful treatment is an antecedent for motivation and retention in the workplace.

Job security also has a major impact on an individual's affective response. It has been proven in previous studies that job security plays a role in how happy an employee is, and individuals will unlikely be happy if there is high rate of unemployment (Di Tella et al.,2001, 2003; Wolfers, 2003) and inequality in compensation (Alesina et al., 2004). If an individual does not feel secure in their place of employment, it can lead to feelings of anxiety. Per Weiss (2002), how satisfied and employee is at their job is based on their affective response or emotional feelings, which comes from what they may think about the job along with different factors. (Yalabik, Popaitoon, Chowne & Rayton, 2013). Based on the information above the following hypotheses are being tested:

H5: Respectful treatment directly affects affective response

H6: Job Security directly affects affective response

Job satisfaction focuses on how much an employee like or dislikes their job, based off of how an employee may feel or their beliefs about the organization that is formed through their affective and cognitive responses to their work environment (Locke 1976; Organ and Near 1985; Judge and Ilies 2004; Richet al. 2010). The beliefs employees develop about different aspects of their job, can have a positive or negative impact on their levels of job satisfaction. Organization's values, and the role management plays help shape the way their employees think about the

organization as a whole. It is important that management be aware of what their employees perceive about the organization, and try to remove any doubt in efforts to increase employee morale.

What an employee thinks or feel about their job will guide how engaged they are in their daily duties at work. If an employee thinks that their job treats them fair and values their work, they will go above and beyond to get the work done, while an employee who thinks the opposite may slack in their workload. How committed an employee is to an organization is affected by an individual's cognitive state of mind which helps to build relationships within the organization and determine whether an employee will stay and demonstrate high work engagement (Mowday,Porter and Steers 1982). Affective and cognitive response work hand in hand in regards to work engagement. The way a person thinks about their job, will in turn affect how they feel, which will have an impact on how engaged and committed they are to the organization. Based on the information above the following hypotheses are being tested:

H7: Cognitive response directly affects job satisfaction

H8: Cognitive response directly affects employee engagement

When employees feel valued and important, and emotionally tied to their organization, it makes them appreciate their job even more. For example, when an employee feels that their efforts are being noticed and is excited about coming to work, it makes them feel satisfied in their current position. Employees, who feel that they are valued and treated with respect by their employer, will develop positive attitudes and behaviors and will increase their level of commitment. This is referred to as the social exchange theory (Cropanzano and Mitchell 2005). When employees are attached to their organizations, it makes it easier for them to ask for the resources that they need, along with putting more energy into their jobs. All in all, individuals who are emotionally attached to their organization will be more inclined to fulfill their work goals, and enjoy their jobs more (Yalabik, Popaitoon, Chowne & Rayton, 2013)

As previously mentioned, because humans are emotional beings, it is important to focus on affective responses. Whether or not an employee feels respected and valued by their organization determines whether or not they will have positive or negative affective responses (Rogel, 2014).Employee engagement is linked to how committed they are to their organization; thus, if an organization is compatible with the employees needs then it is likely employees will feel a sense of job fulfillment and therefore, will feel more motivated and engaged, resulting in an increase in overall job performance. Based on the information above the following hypotheses are being tested:

H9: Affective response directly affects job satisfaction

H10: Affective response directly affects employee engagement

Respectful treatment is something that humans anticipate when working for organizations and when involved in any form of human interaction. Nowadays, teamwork is essential in the workplace and is consistently promoted in education. When working with other team members, it is imperative to treat team members equally with respect. In a study conducted to test the effects of work friendship on job satisfaction, it was found that friendship opportunity has a strong impact on job satisfaction, vigor and dedication and it affects the absorption dimensions weakly (Aras and Özsoy 2012). Although workplace friendship and respectful treatment are not interchangeable terms, it is important to know in order to have workplace friendship, respectful treatment must be present. This relationship shows how respectful treatment indirectly affects job satisfaction.

According to (Saks, 2006; Simpson, 2009), previous empirical research suggested that job satisfaction predicts work engagement. Because job satisfaction is a precursor of job engagement, respectful treatment indirectly affects work engagement. When employees are not treated with respect in the workplace, they are typically not satisfied with their jobs. When employees lack a certain level of job satisfaction, work engagement is decreasing. Quite naturally, when employees are not treated with respect work engagement will lack. A level of focus is placed on not being treated respectfully and work engagement is decreasing. In most cases more time is spent thinking about and speaking about not being treated respectfully versus working through the unpleasing moments of disrespectful treatment. Based on the above information the following hypotheses will be tested:

H11: Respectful treatment indirectly affects job satisfaction

H12: Respectful treatment indirectly affects work engagement

It is understood that compensation indirectly affects job satisfaction but the indirect effects are not quite as clear. According to Yaseen (2013), most individuals feel that if they work hard and exceed performance measures, that they will automatically get a raise and promotion. This causes their levels of job satisfaction to increase. Fair compensation promotes a level of respect for authority within organizations and employees' level of satisfaction increases.

When considering the effects of compensation on how engaged an individual is at work, it is important to understand that compensation does not just refer to one's salary or even monetary value. Compensation packages can also include paid vacations, health insurance, work-life balance and employee perks. In fact, compensation refers to all streams of income and financial gains an employee receives from their work relationship with an organization according to Milkovich et al. (2005). Of course people work for the money, but in today's society, there has been an equal emphasis placed on other areas of compensation. Individuals that do not feel satisfied with their overall compensation or feel that their compensation package is fair could

lead to unhappy employees which will decrease the amount of engagement that they feel in the workplace. Based on the above information the following hypotheses will be tested:

H13: Compensation indirectly affects job satisfaction

H14: Compensation indirectly affects work engagement

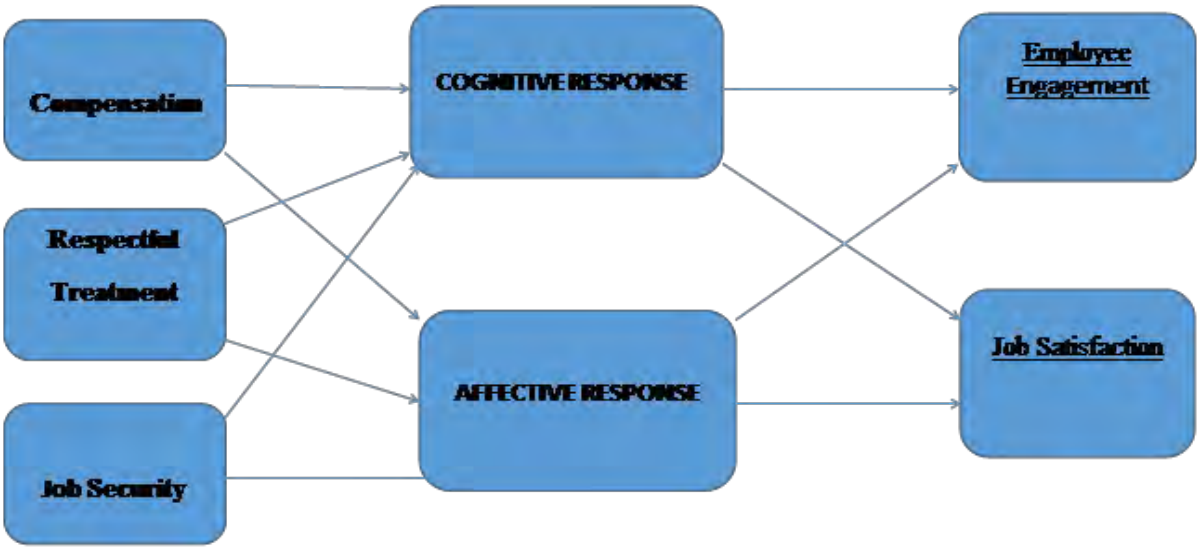
It is expected for individuals to not be satisfied on the job as a result of questioning his or her job security. The effects of job insecurity can have an immediate and long term effect, according to Sverke et al. (2002). Attitudes are considered as immediate effects and behaviors as long term effects. When individuals question the security of their jobs, their level of job performance tends to decline as a result of searching for a mental state of comfort. Though these internal perceptions are on an individual basis, they tend to affect organizations as a whole. Therefore, job security preceding an indirect effect on job satisfaction. Based on the above information the following hypothesis will be tested:

H15: Job Security indirectly affects job satisfaction

Individuals want to feel a sense of security within their place of employment. They want to know that they have a steady income to support themselves and their families. When an individual feels threatened at their job, or feel that their position will be eliminated, this causes an employee to feel insecure in their job (Caplan, Cobb, French, van Harrison & Pinneau, 1980; De Witte, 1999). How people feel in regards to job security can have a major impact on employee engagement. For instance, an individually that is completely engaged at work is likely to have longevity with their organization, put forth their best efforts within their role and speak positively about their organization. However, if it is perceived that there is potentially for job loss than that can impact these positive behaviors and the contrary could occur where people will be more likely to explore their options to work for other organizations, not put forth their best efforts within their role and speak negatively about their organization. Job insecurity can lead to an employee getting burnout and decreasing engagement levels, due to its effect on an individual's overall happiness (Bosman, Rothman and Buitendach, 2005). Based on the above information the following hypothesis will be tested:

H16: Job Security indirectly affects work engagement

PROPOSED MODEL



Methods and Procedures

Our data was collected from surveys that were administered to employed individuals. The survey consisted of a total of 4 pages, and would take approximately 10 minutes to complete. Questions was based on a 5 point Likert scale from 1 (Strongly Disagree) to 5 (Strongly agree), and was based on the variables respectful treatment, compensation, job security, employee engagement, overall job satisfaction, affective response and cognitive response and background information. Background information sheet consisted of questions related to the individual's gender, age, and race, current area of employment, work experience, and years of work experience in current field. Participants that filled out the survey were volunteers. During data cleaning, some questionnaires were eliminated due to error. Data was entered into SPSS, and

EFA (exploratory factor analysis) was conducted to determine the relationships between the variables. A CFA (confirmatory factor analysis), was then conducted using AMOS to test whether the measured variables represent the number of constructs. Standard regression was run in excel, and then Cronbach validity test and structural equation modeling was done in AMOS.

Measures

The compensation usage scale (5 item scale) was based off of a 5 point Likert scale developed from Yaseen (2013) , the instrument uses a 5 point Likert scale from 1 (Strongly disagree) to 5 (highly agree). High score indicates that the respondents agree that the organization offers fair and high compensation. An alpha value of (.710) was obtained for the compensation scale. The respectful treatment scale(5 item scale) was based off of a 5 point Likert scale developed from Wood et al, (2012), which utilizes a 5 point Likert scale from 1(Strongly Disagree) to 5 (Strongly Agree. High score indicates that the respondent feel that they are highly respected within the organization. An alpha value of (.758) was obtained for the respectful treatment. The job security usage scale was based off of a 5 point Likert scale developed from Reisel,et al (2010), the instrument uses a 5 point Likert scale from 1 (Strongly disagree) to 5 (highly agree). High score indicates that the respondent feels that they have job security. An alpha value of (.820) was obtained for job security. The affective and cognitive response (5 item scale), was based off of a 5 point Likert scale developed by Yalabek et al (2013), which utilizes a 5 point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). High score indicates that the respondents feel that their work environment has an effect on their cognitive and affective response. An alpha value of (.609) was obtained for affective response, and an alpha value of (.550) was obtained for cognitive response. The job satisfaction scale (5 item scale), was based off of a 5 point Likert scale developed from Brunetto et al (2012) , with 1(strongly disagree) to 5(Strongly agree). High score indicates that the individuals have a high level of job satisfaction. An alpha value of (.889) was obtained for job satisfaction. The work engagement usage scale(5 item), was based off a 5 point Likert scale developed from Rayton, B.A. (2012), with 1(Strong disagree) to 5(strongly agree). High score indicates that the individuals have a high sense of work engagement. An alpha value of (.853) was obtained for work engagement.

SAMPLE AND DATA ANALYSIS

Our data was collected from surveys that were administered to over 200 employed individuals, with 180 respondents returning completed questionnaires (91%). Table 1 below shows the number of participants used along with varying demographic information.

Table 1- Demographic Characteristics

Demographic Characteristics

Sample Characteristics (n = 180)	**% of Sample**
Gender	
Male	33.3%
Female	66.7%
Race	
Caucasian	17.2%
African American	75.6%
Hispanic	3.3%
Asian	1.1%
Native American	.6
Pacific Islander	.6
Other	1.7
Age	
18-25	31.7%
26-34	23.3%
35-54	32.2%
55-64	9.4%
65 and over	3.3%
Current Employment	
Healthcare	10.6%
Transportation	13.9%
Education	25%
Customer Service	34%

Business Other	10% 6.1%
Work Experience	
None	3.3%
Less than two years	13.3%
Two years to less than four years	13.3%
Four years to less than six years	12.8%
Six years or more	57.2%
Current Job	
Less than 1 year	36.7%
2-5 years	29.4%
5-10 years	13.3%
More than 10 years	20%

Items related to compensation, respectful treatment, job security, affective response, cognitive response, job satisfaction and work engagement were summed to form total scores and were subject to path analysis utilizing structural equation modeling (Amos). A one-way Anova analysis for all variables with gender as categorical variable is conducted using SPSS software.

Table 2- Amos Output: Structural Equation Modeling

Table 2 consists of mean, standard deviation, and zero-order correlations for all variables in the model. From Table 2

	CR	AVE	MSV	Max R(H)	OJS	C	RT	JS	CR
OJS	**0.91**	**0.68**	**0.57**	**0.93**	**0.82**				

	3	**0**	**3**	**4**	**5**				
C	**0.739**	**0.424**	**0.410**	**0.947**	**0.640**	**0.651**			
RT	**0.778**	**0.479**	**0.501**	**0.958**	**0.630**	**0.308**	**0.692**		
JS	**0.825**	**0.544**	**0.576**	**0.966**	**0.757**	**0.605**	**0.708**	**0.737**	
CR	**0.568**	**0.328**	**0.020**	**0.968**	**-0.010**	**0.142**	**-0.092**	**0.047**	**0.573**
AR	**0.600**	**0.334**	**0.423**	**0.969**	**0.330**	**0.309**	**0.650**	**0.552**	**.0791**
EE	**0.855**	**0.544**	**0.576**	**0.974**	**0.710**	**0.343**	**0.682**	**0.759**	**.0671**

Values from .10 to.29 indicates a small relationship. Values from .30 to .49 indicates a medium relationship, and values from .50 to 1.0 equals a large relationship. Our model did have some validity concerns. Discriminant validity is demonstrated due to the AVE ,RT, AR, EE and JS being less than the MSV. Convergent validity is demonstrated due to AVE from CR, C, RT, AR, and EE being less than MSV. The table above also shows some reliability concerns due to the CR being less than .70 for CR and AR.

Table 3- One Way Anova

A one way ANOVA analysis was conducted to test the gender differences amongst the variables respectful treatment, compensation, job security, employee engagement, job satisfaction , affective responses and cognitive response. Based on the below results, it was found that there was no significant difference amongst genders in response to the below mentioned variables.

Table-3. One-way ANOVA Testing Procedure for the Categorical Variable Gender (n=180)

Gender[1]	F-value	p-value
RT	**0.595**	**0.442**
C	**1.186**	**0.180**
JS	**1.738**	**0.189**
OJS	**0.178**	**0.673**
EE	**1.447**	**0.231**
AR	**0.559**	**0.456**
CR	**1.480**	**0.225**

****Significant at the 0.01 level; *Significant at the 0.05 level- There was no levels of significance in gender amongst the variables**

[1]variable denotes categorical variable

RT = Respectful Treatment

C = Compensation

JS = Job Security

OJS = Overall Job Satisfaction

EE = Employee Engagement

AR = Affective Response.

CR = Cognitive Response

Structural Equation Model

In order to analyze the results a covariance based SEM is used. Prediction-oriented measures that are parametric is used for the evaluation of the covariance-based structural equation modeling (Hair et al., 2009). There are several indices that are reported in covariance based SEM including GFI, NFI, RMSEA, and CFI (Hair et al, 2009). All of the indices that measures how well the model fits (excluding RMSEA), performs this by comparing the model that is fitted with the data, and these values usually range from 0-1. Any value that is higher than 0.9 demonstrates an acceptable fit (Hair et al., 2009).

One of the few measures used in assessing the overall model fit, and "assesses the magnitude of discrepancy between the sample and fitted covariance matrices" is Chi-square (Hu & Bentler, 1999: 2), when the Chi-square value is high this indicates that the model is of poor fit. Due to the fact that the Chi-square depends on the degrees of freedom heavily dependent on the degrees of freedom. The Chi-square is normally high and the value of Chi-square is always substantial when there is a large sample size, but a better measure is Chi-square ($\chi 2/df$) (Wheaton et al., 1977).GFI and AGFI proposed by Jöreskog and Sorbom is an alternative to Chi-square (Tabachnickb & Fidell, 2007). As long as the Goodness of Fit index and the AGFI value is 0.9 or above, this indicates that the model has an overall good fit. (Miles & Shevlin, 1998). The root mean square error approximation (RMSEA) is utilized as it provides an estimate for how much error is within the model. The TLI (Tucker-Lewis Index) assesses model fit by placing penalty

on the model for additional parameters added to the model. The NFI provides information on how much better does a model fit compared to the baseline model (Bentler & Bonett, 1980). CFI compares the predicted covariance matrix to observe covariance matrix.

The measurement model as shown in Table 4 has all the fit indices above acceptable threshold levels. The Chi-square statistic was low, and has a nonsignificant p-value.

The root mean square error approximation (RMSEA) less than 0.08 is indicative of an acceptable model (MacCallum et al., 1996), RMSEA value of the current model is equal to 0.079, indicating a good fit (MacCallum et al., 1996). The GFI value is not above its recommended threshold level of 0.90, but it's fairly close (Tabachnick & Fidell, 2007). The NFI is not above threshold level, along with the CFI. Overall, indices are found to have unacceptable threshold values, indicating a satisfactory fit.

Table 4 - Fit Indices for the Baseline Model 1

Model	(df)	p-value	x^2/df	RMSEA	GFI	TLI	NFI	CFI
Baseline	720 (340)	0.00	2.11	0.079	0.783	0.818	0.733	0.836

[1]Statistics are based on a sample of 180 respondents

Degrees of freedom are in parentheses after Chi-square value.

RMSEA = Root mean square error of approximation.

GFI = Goodness-of-fit index.

TLI = Tucker-Lewis index.

NFI = Normed fit index.

CFI = Comparative fit index.

df = Degrees of freedom.

Table 5 – Unstandardized Structural Coefficients for Model

Parameter	Path Coefficient	T-VALUE	R^2
OJS			**55.2%**
CR	0.00	-0.05	
AR	0.74	3.29**	
EE			**47.8%**
CR	0.02	0.18	
AR	0.74	3.10**	
CR			**36.2%**
C	0.16	1.61	
RT	-0.18	-1.89	
JS	0.09	0.94	
AR			**45.2%**
C	0.23	2.3**	
RT	0.56	3.05**	
JS	0.72	3.25**	

[1]Statistics are based on a sample of 180 respondents.
[2]These are endogenous variables in the model; the exogenous variables are listed underneath.
*Significant at the 0.05 level; **Significant at the 0.01 level.

EE = Employee Engagement

RT = Respectful Treatment

C = Compensation
JS = Job Security
AR = Affective Response
OJS =Overall Job Satisfaction
CR = Cognitive Response

[1]Statistics are based on a sample of 180 respondents.
[2]These are endogenous variables in the model; the exogenous variables are listed underneath.
*Significant at the 0.05 level; **Significant at the 0.01 level

Table 5 presents the unstandardized structural path coefficients for the model. With job satisfaction and employee engagement as endogenous variables, and Respectful Treatment, Compensation and Job Security as exogenous variables and Cognitive and Affective Response as mediating variables. Table 5 also provides information if the path is significant.

From the data we find that there is no support for hypothesis 1-3, which means that none of the variables (respectful treatment, job satisfaction, and compensation), have an affect on an individual's cognitive response. From the above table we also found lack of supports for hypothesis 7 and 8, which suggests that cognitive response has an effect on job satisfaction and employee engagement.

There is also lack of support for hypothesis 11 through 16, which suggest that none of the variables mentioned have an indirect effect on each other. The model does help to provide proof for Hypothesis 4, 5, 6 and 9, which states that there is a direct relationship between and individual's affective response and compensation, affective response and respectful treatment, affective response and job security and affective response and overall job satisfaction. It also provides proof for Hypothesis 10 which states that there is a direct relationship between employee engagement and affective response.

MANAGERIAL IMPLICATIONS

Recognizing the need for employees to feel a sense of satisfaction at work is the essential first step to improving such issues. However, organizations should take it a step further by implementing a course of action (or strategy) to optimize these drivers for employees within the organization. Listed below are a few recommendations based on the information we have discussed that can help organizations and the leaders and/or management within the organizations to focus on initiatives to promote a mutually beneficial work relationship for the employee and employer that will create opportunities for employees to utilize their skill sets and encourage autonomy.

Remember, humans are emotional beings which are why we identify with the affective domain and we must consider emotional responses of employees towards their jobs. Hence, it is imperative that manager's check in with their team (employees) on a consistent basis to discuss progress towards goals provide acknowledgement of accomplishments while still being able to provide constructive coaching to help them improve upon their skills and become successful. All in all, managers and employees should develop a positive and respectful relationship which was

ranked as being a top factor in achieving job satisfaction (even slightly more important than compensation and pay). Moreover, employers and employees should discuss engagement on a regular basis to develop an open and honest relationship which will also instill a sense of trust amongst them. This is a good way to ensure that employees are staying productive and engaged.

A good way to help tap into this aspect of the human need is to provide career development and opportunities for growth. In efforts to keep employees engaged, it is important that organizations provide opportunities for career development, and provide ongoing opportunities for employees to advance their careers (ADP Research Institute, 2012). It is important for employers to implement an agenda in which employees and managers are working together in creating weighted goals, development of activities and competencies that again are mutually beneficial in that they meet both the needs of the individual and the organization. By doing this, it will require follow up from the second recommendation that strongly suggests regular follow-through in order to optimize engagement; employees and managers should meet periodically throughout the year to discuss progress. While monetary rewards and compensations would be very effective in helping attain job satisfaction and employee engagement which as we previously discussed, is one of the top contenders that employees said that they felt enhanced job satisfaction, sometimes that is not an option as budget constraints limit rewards like bonuses and salary increases. However, managers can still motivate employees through other avenues such as presenting them with opportunities that expand their expertise within the organization, exercise their leadership skills further, and expose them to other areas of the business.

CONCLUSION

The purpose of this study was to discover the effects that variables such as respectful treatment, job security and compensation have on individual's affective and cognitive response, which will in turn affect how their overall job satisfaction level and work engagement. Utilizing structural equation modeling a few of the hypothesis were evaluated. Results show that there is a significant relationship between affective response and respectful treatment, affective response and job security, affective response and employee engagement, overall job satisfaction and affective response, and affective response and compensation. Additionally we also found that there is no significant relationship between the variables and cognitive response, or any indirect relationships between the variables.

While we had a large sample size, there were still a few limitations to our study. For starters, 120 respondents were female 120 (66%), while the other 34% were male. Over 75% of the respondents were African American with 32% ranging between the ages of 35-54, 31 % ranging between 18-25, 23% ranging between 26-24, and the remaining 14% being 55 and over. In future studies a wider base of respondents with equal amount of males and females should be implemented, so it won't appear that the data is biased. Along with this, future research should

focus on obtaining information from a variety of individuals with diverse backgrounds and work experience. A majority of the respondents were friends and co-workers that we already knew, so there is a lack of diversity, which possibly brings in room for error. Future studies should also focus on obtaining information from individuals from a variety of different work backgrounds, and also individuals with more years of experience or focus on a certain area (ex.education, healthcare, etc.). In our research, over 34% of respondents were from a customer service background, and another 25% was in education. The remaining 41% was in backgrounds ranging from healthcare to transportation. Future studies should possibly focus on a certain field, and focus more on how the cognitive process plays a role in how an individual feels about their job, as our study fails to prove that there is a relationship between cognitive response and any of the variables. It should also focus more on what managers and organizations can do as a whole to improve relations in the workplace and increase retention efforts for employees.

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ABSTRACT

Abstract

In this paper we test for congruence with Zipf's Law among cities, towns, and communes in Vietnam. Zipf's Law prescribes a particular distribution of cities when ordered by population. Much of the extant literature testing for Zipf's Law utilizes a methodology that has been shown to produce biased estimates in small samples. Here we employ the techniques recommended by Gabaix and Ibragimov (2007, 2011), and focus on 2009 census data of 156 urban areas in Vietnam. We find support for a distribution consistent with Zipf's Law based on the full dataset, and two subsets: cities only, and cities and towns.

Are you using all of the Power of PowerPoint?

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ABSTRACT

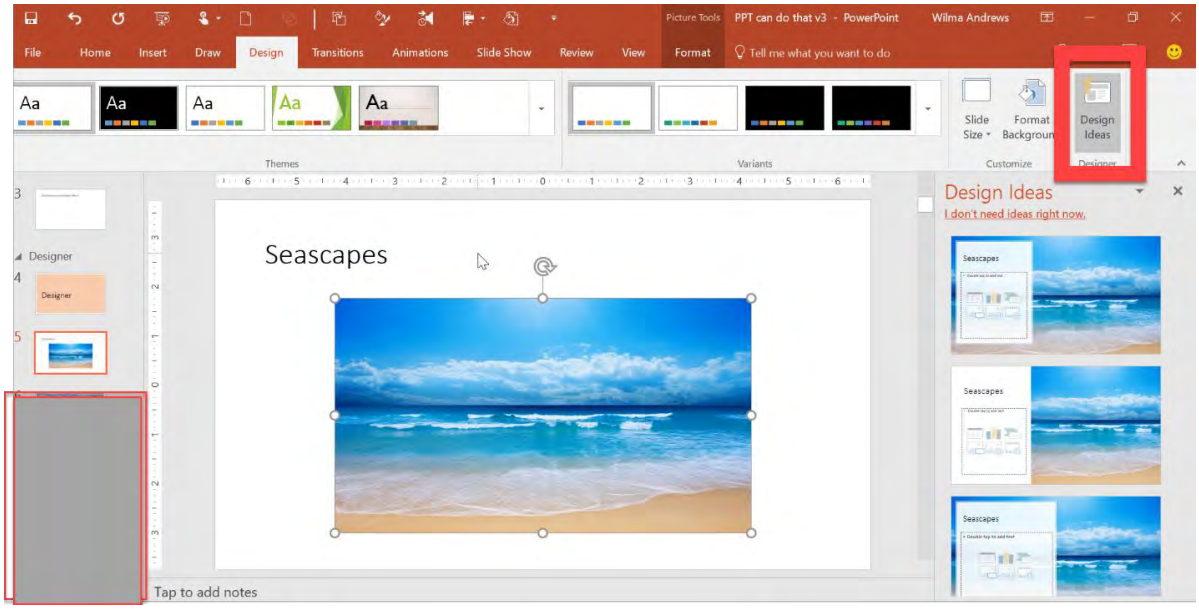
This session will give an overview of newer capabilities that provide more power to PowerPoint. Microsoft has brought out new capabilities in the 365 version of PowerPoint. Morph and Designer are two of these Microsoft enhancements that use Office 365 to make PowerPoint more powerful. Designer helps non-designers create visual slides that look very professional. Morph adds power to PowerPoint by providing animations and transitions that were not previously available in PowerPoint. Zoom adds a Prezi effect to slides. Office Mix is another relatively new feature. This free download is useful to educators in that it enables the creation of interactive online lessons. And 3-D animation thru Windows 10 Paint is projected to be an option soon. All the new features help users create more up to date presentations with increased interactivity. And can be a game changer in how PowerPoint is used in presentations.

PowerPoint 365

Death by PowerPoint is a common expression but it isn't PowerPoint that is to blame because a deadly boring presentation is created by a user, not by the software. Though Microsoft has not introduced any major changes in the PowerPoint 2016/365 user interface, there are new features in PowerPoint 365 that makes it easier for users to take presentations to a new level.

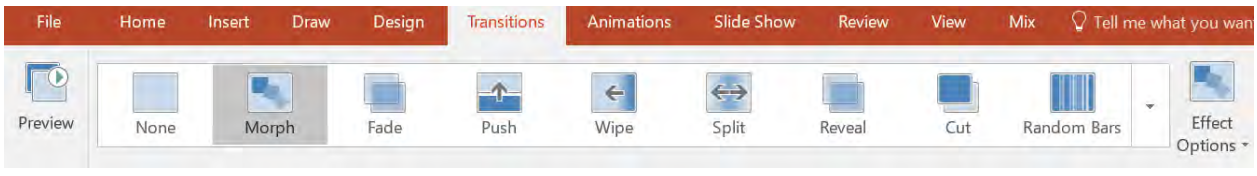
Designer

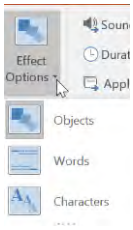
The new PowerPoint 365 **Designer** option makes it possible to create professional looking slides with just the input of an image and a click on one of several design ideas that are generated.



Morph

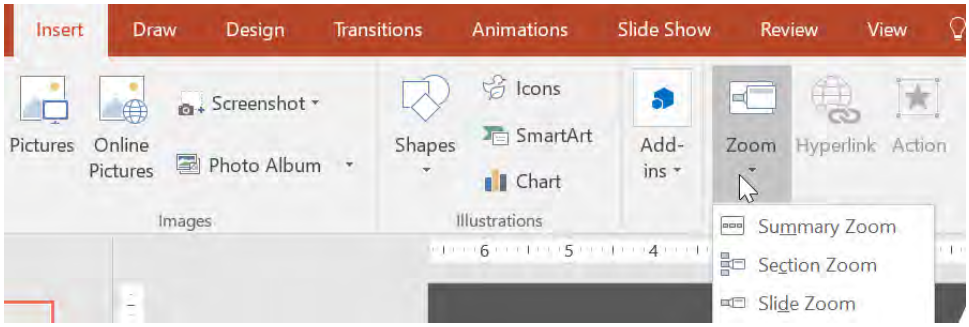
In addition to Designer, **Morph** is a new transition option that enables slides to "morph" from one slide to another with the appearance of animation. Morph makes it relatively easy for the user to create some the really interesting and creative effects without possessing advanced animation skills. The process basically involved copying slides, modifying the subsequent slides and then applying the Morph transition to those slides.





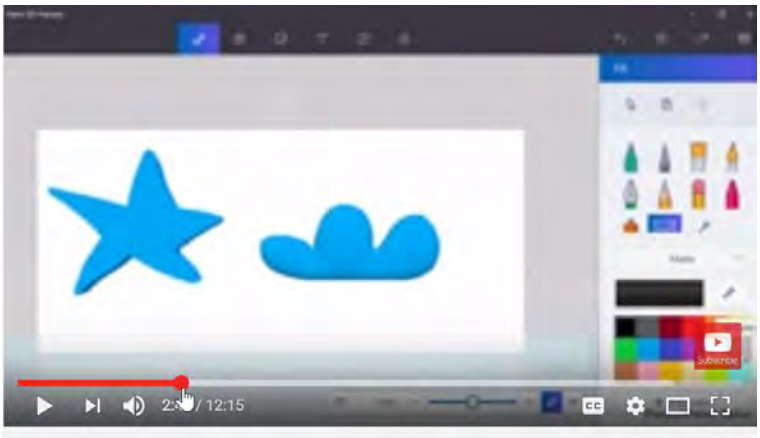
Zoom

Another new 365 feature is **Zoom**. This feature virtually eliminates the linear constraint within a presentation - without the need for advanced animation skills. Located at the Insert tab in the Links group, Zoom offers three different options – Create Summary Zoom, Create Section Zoom, and Create Slide Zoom. These options enable the presenter to move about within the presentation just by clicking on different sections of a slide.



Windows 10 3-D Paint

And just announced is a Windows 10 3-D Paint option that will soon be incorporated into PowerPoint. That feature along with Morph and Zoom will be game changers to how presentations are done.

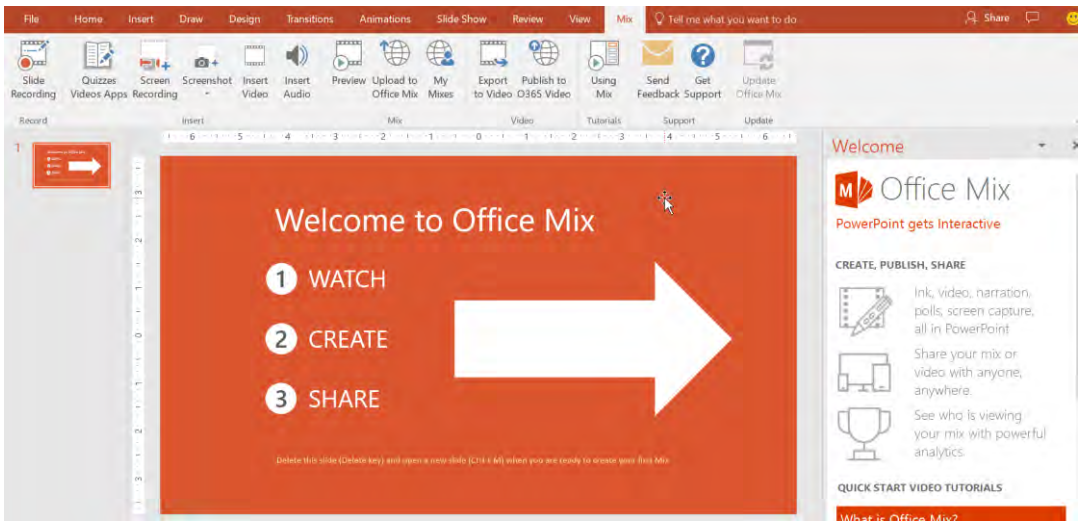


Paint 3D Preview with PowerPoint Animation

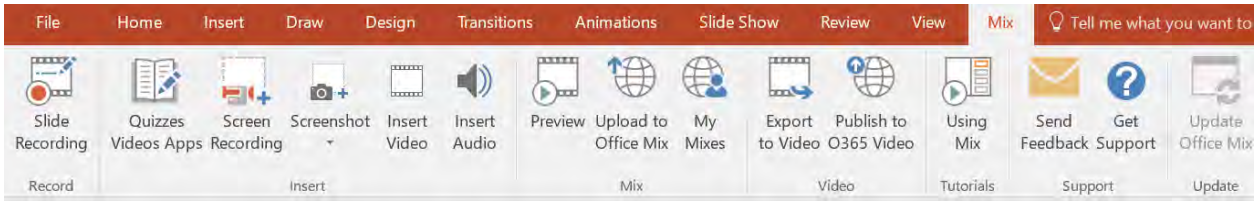
https://www.youtube.com/watch?v=Xe3OF6Xgstg

Office Mix

In Fall 2014 Microsoft introduced the PowerPoint Add-on named **Office Mix**. This free Microsoft download for PowerPoint is currently available to use with Office 2013, 2016 or Office 365 on PCs. Even though it has been available for over two years, it is still relatively unknown.



There are many options for use that make it a great additional tool for online training for supplements for traditional courses or for creating lectures for online courses. With Office Mix each PowerPoint slide can basically become a multimedia collection of whatever the “Mix” creator wants to put on it.



The possibilities for slide content include active websites, screen shots, quizzes or the use of other software. For the traditional class, the faculty member can record the entire class or segments of the class and then post the link or links on course management software or e-mail the link to the students after the class. Faculty wanting to flip classes can create mixes and share them with students for them to view prior to the class meeting. Since the Office Mix software is free, faculty can have students use it to record individual or group presentations and submit them for grading and/or make them available for the class members to watch and critique.

Assessing Outsourcing Strategy on quality and performance of US Long-term Healthcare

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ABSTRACT

Outsourcing is a strategy of focusing on-core capabilities within an organization while creating a network of external experts in support skills. The US healthcare industry utilizes outsourcing to cope with reimbursement reductions from the 1997 Balanced Budget Act and managed care regulations. Specifically, US healthcare executives face the challenge of reducing costs while maintaining quality patient care in an environment of continuous change and turbulence. As such, outsourcing has become one of the strategic tools healthcare organizations use to control costs without affecting patient care. This study uses transaction cost economic theory to argue that contractual relationships among and within firms arise from efficiency-seeking actions; likewise, organizations incur costs as a result of planning, implementing, and enforcing exchanges with other organizations. With respect to external supplier exchange relationships, transaction costs can include costs associated with contract negotiations, monitoring adherence to contractual terms, providing financial incentives or penalties, and losses resulting from supplier noncompliance. This research maintains that a well-developed outsourcing strategy can reduce operational costs and improve the quality of long-term care facilities. The results also show that healthcare facilities can increase financial performance by building trust and relationships with outsourcing vendors.

INTRODUCTION

Outsourcing has been implemented in many areas and industries such as finance, accounting, information systems, manufacturing, and personnel. Outsourcing has been defined as an "act of moving some of a firm's internal activities and decision responsibilities to outside providers" Chase et al. (2004, p. 372). Recently, numerous manufacturing companies have outsourced part of their production process (Boulaksil and Fransoo, 2010). Outsourcing is often called a "make-or-buy" decision. Many firms must choose what to perform internally versus what to "buy" in the marketplace. Generally, the common reasons for companies to decide to outsource involve the potential to reduce costs and increase flexibility. Many studies have indicated the predominant reason for offshoring and domestic outsourcing is a short term price saving (Ellram et al., 2008).

Companies might outsource professional services in information technology, accounting, and payroll which require unique skills, thereby providing companies with better and more state of the art services than they are able to afford internally. Notably, many organizations have been warned not to outsource items that are part of their core competency (Arnold, 2000; Prahalad and Hamel, 1990; Venkatesan, 1992; Quinn and Hilmer, 1994). A focus on core capabilities is one reason that organizations are increasingly outsourcing non-core activities to external vendors (Krause, 1999). For a traditional manufacturing organization, the development and maintenance of new technologies that do not directly support manufacturing activities may lead to a drain on

company resources, and thus, become a suitable candidate for outsourcing (Samaddar and Kadiyala, 2006). Nevertheless, the firms should maintain suitable controls and monitoring of outsource relationships.

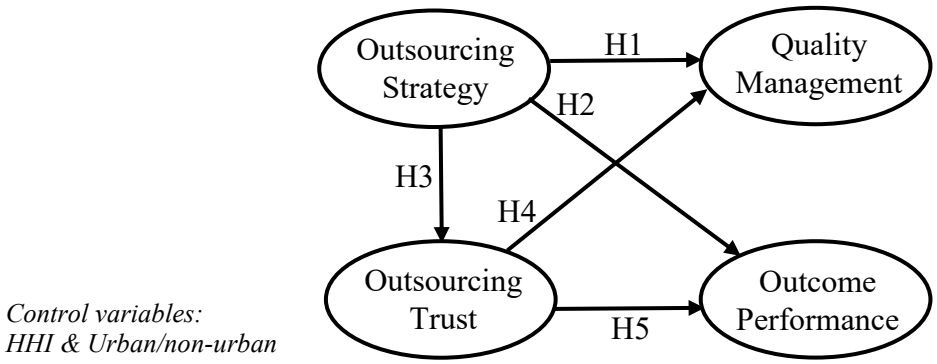
The US healthcare industry has utilized outsourcing to cope with reimbursement reductions from the 1997 Balanced Budget Act and managed care regulations. Specifically, US healthcare executives face the challenge of reducing costs while maintaining quality patient care in an environment of continuous change and turbulence. Most US hospitals and healthcare systems are dealing with reimbursement reductions due to budget cuts in Medicare and Medicaid. Recently, the Affordable Care Act requires improvement of quality indicators in order to receive reimbursements. In order to cope with this situation, the healthcare industry has begun focusing on outsourcing as a way of lowering overall costs. As such, outsourcing has become one of the strategic tools healthcare organizations use to control costs without affecting patient care. In a typical skilled nursing facility (SNF), numerous parties exchange goods and services in the delivery of care. Specifically, resident care is rendered through a complex series of transactions among various parties, including, but not limited to: physicians, pharmacists, equipment distributors and manufacturers, rehabilitation therapists, laboratorians, and dieticians. Some of these transactions occur among the employees of the nursing home while others involve contractual relationships with outside parties (Zinn et al., 2003). The most outsourced functions in US healthcare are information technology (29%), finance (20%), and support services (19%) (Roberts, 2001).

Given the continued growth expected in healthcare outsourcing, healthcare executives need to avoid the failures and problems experienced in other industries by strategically managing outsourcing. This study suggests that contractual relationships among and within firms arise from efficiency-seeking actions transition into outsourcing strategies; likewise, organizations incur costs as a result of planning, implementing, and enforcing exchanges with other organizations. With respect to external supplier exchange relationships, transaction costs can include contract negotiations, monitoring adherence to contractual terms, providing financial incentives or penalties, and losses resulting from supplier noncompliance. This research maintains that a well-developed outsourcing strategy can reduce operational costs and improve the quality of long-term care facilities. The results also show that healthcare facilities can increase financial performance by building trust and relationships with outsourcing vendors.

LITERATURE REVIEW AND HYPOTHESES

This section provides the literature review for outsourcing strategy and outsourcing trust. Furthermore, the theoretical hypotheses will be established within the literature review. Please see Figure 1 for the research model.

Figure 1. Research Model



Outsourcing Strategy

Manufacturing outsourcing has been common practice for decades. Thus, manufacturing outsourcing was given much attention in the late 1980s and early 1990s. At that time, a fear existed that industrialized nations were compromising their long-term competitiveness by "hollowing out" their manufacturing through outsourcing. Presently, attention is more often focused on the outsourcing of professional services (Ellram et al., 2008). Some managerial concerns regarding outsourcing are that firms might suffer a loss of control of their core activities; however, other viewpoints exist in which managers focus on the strategic implications (Quinn and Hilmer, 1994), financial and human resource implications (Lever, 1997), and the outsourcing of logistics functions to outside vendors (Andersson and Norrman, 2002).

Beyond the initial motivations and implications of outsourcing, many studies have investigated the benefits of outsourcing (Jiang et al., 2007), as well as the risks (Schniederjans and Zuckweiler, 2004). Many organizations are outsourcing non-core activities to external organizations in order to concentrate on core capabilities (Krause, 1999). Some companies wish to preserve their company's resources due to the high cost of R&D and attaining new technologies that do not directly support their core competency; these areas could then become candidates for outsourcing (Samaddar and Kadiyala 2006).

Strategic outsourcing decisions have been mainly motivated by the transaction cost theory (TCT) (Holcomb and Hitt, 2007), resource-based view (RBV) (McIvor, 2009), and a focus on core competences (Prahalad and Hamel, 1990). This specifically involves the decisions related to whether to outsource or not, the operational planning and control of outsourced operations, as well as resolving any operational issues that follow the outsourcing decision. Certainly, the strategic outsourcing process can be very complex among different functional departments. Thus, careful planning of the structure process for outsourcing is essential. Moreover, determining which functional activities or areas are suitable to be outsourced and which suppliers or vendors are qualified is an important process. Furthermore, risk associated with the outsourcing process and outsourcing contracts must be considered. These are crucial elements for good design strategic outsourcing (Amaral et al., 2006). A firm’s performance may suffer disproportionately due to outsourcing an amount that is different from the optimal degree of outsourcing. This relationship brings about an inverted U shape, which shows how a firm has veered away from the optimal degree of outsourcing (Boulaksil and Fransoo, 2010).

Due to dependence on governmental reimbursement policies, US healthcare firms face the challenge of reducing costs while maintaining quality patient care in an environment of

continuous change and turbulence. Outsourcing involves transferring services or operating functions that are traditionally performed internally to third-party service providers and controlling the sourcing through contract and partnership management (Amaral et al., 2006). Recently, outsourcing has become one of the key strategic tools used by healthcare executives to control costs without affecting patient care. In general, similarities exist between healthcare industries and manufacturing firms regarding outsourcing: (1) whether to allocate the resources to generate most efficiency and (2) whether to reduce resources when they are not effective. Thus, healthcare management must determine the areas in which they are least efficient and outsource to the most efficient vendors. However, since healthcare is a highly service oriented industry, customers require more personal contact. In certain situations, outsourcing might undermine the core competencies for the firm's future capabilities and development (Roberts, 2001).

Information technology (IT) has the potential to improve quality and dramatically reduce costs by streamlining back office operations. IT is known for better problem-solving and seeking higher efficiency, which may include reducing the cognitive burden of practitioners, and automating patient safety practices in healthcare (Hillestad et al. 2005). In US healthcare, a level of diversity exists among technological tools and software which may have a positive effect on the ability to provide better quality of care due to its support of administration, clinical, and patient care (Alexander and Wakefield, 2009). Nursing home technologies have been lacking business applications concerning billing/claims, eligibility processing, and the minimum data set. In addition, nursing homes rarely reach these levels of sophistication; for example, few nursing homes incorporate electronic health records into clinical processes (Alexander, 2008). Thus, the skilled nursing facilities (SNF) might not have the necessary expertise in information technology. If SNFs implement effective strategic outsourcing of IT to external vendors, SNFs can concentrate on the core-competencies in patient care. Therefore, we propose:

Hypothesis 1: Strategic outsourcing will lead to improved quality management.
Hypothesis 2: Strategic outsourcing will lead to improved performance.

Outsourcing Trust

In most circumstances, the process of outsourcing is very complex. Therefore, outsourcing plans must be organized carefully and risks should be considered as well. Strategic outsourcing can be partly managed by investing in processes and information systems to further building a good relationship with contractual suppliers (Amaral et al., 2006). Zinn et al. (2003) stated that transaction costs with subcontractors can be assessed via contract negotiations, incentives or penalties, and monitoring the contractual conditions or noncompliance from suppliers. Generally, firms may encounter two internal uncertainties: not knowing what they want from the process and being unable to confirm whether a supplier has performed all the contractual requirements (Ellram et al., 2008). When conflict happens without incentives to settle disputes, the firms eventually change providers (Lavoie et al., 2010). Contractual deficiencies may lead to marginalized service performance; in such instances, the standards of service often are difficult to measure and monitor effectively. These deficiencies lead to further obligations for firm's internal staff to cope with unfulfilled work by external vendors. Thus, detailed contractual arrangements should be established among two parties (Young and Macinati, 2012). Moreover, building a relational contract which is co-operative and flexible allows mutual planning and bargaining between the firms. Hence, a stable process of building trust can occur through a series

of negotiation and communication among the parties. Relationship and trust develop over time via repeated interactions, established goodwill, taking risks and matched performance (Fernandez, 2009). Consequently, higher levels of trust can reduce the need to monitor subcontractors thereby reducing unnecessary transaction costs (Lavoie et al., 2010).

Kossover et al. (2014) noted that of the 50 states, 88% allow subcontracting to outside vendors to provide routine medical services onsite to assisted living residents. When it comes to outsourcing of healthcare, many executives have fears which include loss of control and flexibility over the delivery of outsourced services and becoming completely dependent upon vendors or becoming responsible for their actions. Moreover, if outsourced confidential information is exposed by the vendor, then severe consequences may result. As mentioned early regarding outsourcing IT service for the US healthcare industry, some concerns exist for the administrators for SNFs. When a contractor deviates from the agreement, a loss of internal technical skills (IT) and expertise (human resources) occurs, revealing greater risks with outsourcing. There could also be a negative outlook upon an organization's reputation due to the fact that outsourcing is viewed by many Americans as the exploitation of low-cost workers (Roberts, 2001). Furthermore, compliance violations must be considered when an organization outsources billing and reimbursement claims, namely Medicaid and Medicare. In order to prevent a lack of compliance, organizations must evaluate each future outsourcing partner and consider their history of compliance violations in order to determine what measures must be taken to ensure compliance (Gustafson, 2000). Moreover, Zinn et al. (2007) studied such “make-or-buy decision” on nursing home therapy. They found that SNFs shifting from outsourcing therapy to in-house therapy tends to provide better financial performance due to the administrators proactively monitoring outsourcing costs.

However, benefits of outsourcing in healthcare are evident. External vendors can offer integrated services which increase the value for the clients. Additionally, SNFs are reimbursed by the Medicare program under a reasonable cost based system; which directly bill the Medicare program for services rendered onsite, allowing SNFs to avoid clinical and financial expenses associated with administering these services. Nearly 70 percent of nursing home facilities contracted with outside vendors for all physical or occupational therapy services (Zinn et al., 2007). Moreover, highly qualified specialists can deliver IT to enhance the lack of depth of knowledge among SNFs (Roberts, 2001). IT outsourcing generally involves a clear description of the contractual agreement regarding the services to be offered. Both parties should establish good communication regardless of the distance and time between two entities (Thouin et al., 2008). Lorence and Spink (2004) surveyed 16,000 healthcare information managers in the US to assess preferences for outsourcing information systems. They found that the managers believe that outsourcing can improve patient care, cost savings, and competition. Therefore, outsourcing trust and building outsourcing relationships should begin with a well-defined outsourcing strategy and contractual agreements between two parties. Through the process of building the trust with partners, outsourcing can benefit and improve patient quality of care and reduce costs for healthcare industry. Thus, we propose:

Hypothesis 3: Strategic outsourcing will lead to increased outsourced trust.
Hypothesis 4: Building outsourced trust will lead to improved quality management.
Hypothesis 5: Building outsourced trust will lead to improved performance.

DATA AND METHODS

Data Collection

1,500 surveys were distributed to the administrators of U.S. skilled nursing facilities. 264 surveys were received, including the mailings with incorrect mailing address, unwilling participants, or surveys received with more than 20% of the survey items unanswered. A small quantity of missing data items were replaced with scale average scores for this study. Some research studies suggest that facilities with less than 30 beds contain staffing characteristics with low signal-to-noise ratios and should not be included in the analysis (Liu and Castle, 2009). Therefore, the final sample size of 243 valid surveys were analyzed to comprise a response rate of approximately 16.2%. The differences in size of nursing facilities and differences in organizational status (for profit and not-for profit status) were examined between responding and non-responding facilities to test how the sample might differ from the population. The Chi-square test statistic is assessed for the number of beds and indicates a value that is not significant ($\chi^2 = 0.71$, *d.f.* = 2, P = 0.701) showing that the response rate in the number of bed sizes is not significant. Non-respondent bias by nursing home ownership (For Profit, Not-For Profit) was evaluated and also indicated no significant difference between respondents and non-respondents ($\chi^2 = 2.28$, *d.f.* = 2, P = 0.32).

Source of the Data

The data were collected from an archival dataset, followed by a distribution of mail surveys for this research. The archival data were collected from Healthcare Cost Report Information System (HCRIS) which is available through the Center of Medicare and Medicaid Services. The Center for Medicare and Medicaid Services (CMS) gathers nursing home data through surveys or self-reporting systems, including performance of cost, utilization, case-mix severity and quality aspects. The information is compiled into annual summary reports for individual private nursing facilities, nursing home chains and state regulatory agencies (Lenard and Shimshak, 2009). CMS ensures that the data/records/reports to HCRIS are complete, accurate, and comprehensive at the time of publication. This cost report reveals providers' information such as facility characteristics, cost and charges by cost center, utilization data, and financial statement data. Therefore, the outcome performance of operational efficiency and financial performance measurement items are abstracted from the Healthcare Cost Report Information System.

Additionally, a mail survey was conducted by sending survey instruments to the administrators of 1,500 SNFs. The 7-point Likert-scale survey items included in the questionnaires were tested prior to being sent out and validated by other empirical studies. These survey items were comprised of outsourcing and quality management measurements. Please see Table 1 for the data sources. The survey items involving quality management were obtained from Meyer and Collier (2001) who tested the seven categories of the 1995 Baldrige Health Care Pilot Criteria framework. Since then, Baldrige has published the newest 2015-2016 Malcolm Baldrige Health Criteria. However, the content remains similar to the 1995 criteria with only slight modifications of the seven categories' designations to (1) Leadership, (2) Strategic Planning, (3) Customer Focus, (4) Measurement, Analysis and Knowledge Management, (5) Workforce Focus, (6) Operations Focus, and (7) Results.

Table 1. Measurement Scales and Loadings

Outsourcing – Strategy: (AVE=0.693 /CR= 0.876 /CA=0.816)	Item Loading
Source: Samaddar *et al*. (2006)	
Outsourcing information systems can increase our competitiveness	0.827
Our competition has reduced its overall costs by outsourcing	0.803
Our facilities will increase outsourcing in the future	0.785
Our outsourcing decisions can reduce our overall costs	0.783
Outsourcing –Trust: (AVE=0.687 /CR=0.867 /CA=0.769)	
Source: Ellram (2008) and Samaddar *et al*. (2006)	
We trust our outsourcing vendors	0.896
We are satisfied with our outsourcing vendors	0.882
Our outsourcing vendors maintain their contractual obligations	0.692
Quality Management: (AVE=0.531 /CR=0.955) Second-order factor	
Source: Meyer and Collier (2001)	
Leadership: (AVE=0.598 /CR=0.881 /CA=0.830)	
Our senior executives are involved in quality activities	0.842
Our senior executives focus on improving patient care	0.785
We use performance feedback to improve our quality of care	0.783
We integrate public responsibility into performance improvement efforts	0.736
Our employees can articulate the nursing home's mission	0.712
Workforce Focus: (AVE=0.640 /CR=0.899 /CA=0.860)	
We use a variety of methods to measure employee satisfaction	0.828
Employees are rewarded for learning new skills	0.810
We derive employee development objectives from strategic objectives	0.796
Our work environment supports the well-being and development of all employees	0.792
Frontline employees are trained on how to handle service failures	0.775
Customer Focus: (AVE=0.693 /CR=0.900 /CA=0.852)	
Using multiple sources for patient feedback	0.868
Coordinating patient feedback across all departments	0.846
Using patient feedback to plan future service delivery systems	0.830
Identify potential (currently unserved) market segments	0.784
Measurement, Analysis and Knowledge: (AVE=0.585 /CR=0.875 /CA=0.821)	
Organizational planning is based on objective data which we have collected and analyzed	0.819
We use our data to identify trends that help us set priorities in how our resources are used	0.794
We use objective data to identify our competitive strength	0.788
We use benchmarking information to identify areas that need improvement	0.726
Our information systems support front line employees	0.692
Financial Returns: (AVE=0.692 /CR=0.813 /CA=0.628)	
Source: Healthcare Cost Report Information System (HCRIS)	
Net Patient Revenue	0.967
Operational Margin	0.670
Operational Efficiency: (AVE=0.963 /CR=0.981 /CA=0.962)	
Source: Healthcare Cost Report Information System (HCRIS)	
Operating Expenses	0.982

Total Salary	0.981

AVE=average variance extracted, CR=composite reliability, CA=Cronbach alpha

Validity Measurements

A second-order reflective construct for quality management is designed for this analysis to reflect Malcolm Baldrige Health Care Criteria. Next, confirmatory factor analysis of indicators for construct validity is assessed to test for general reliability by applying Partial Least Squares Structural Equation Modeling (PLS-SEM) to model internal consistency procedures (Gefen and Straub, 2005). All composite reliability values are between 0.981 and 0.813 which exceed 0.70, thereby indicating acceptable reliability. All average variance extracted (AVE) values range between 0.963 and 0.531 (at construct level) which is greater than 0.5. This suggests that convergent validity at the indicator and construct levels are verified. The square root of each AVE is examined for the discriminant validity and should be greater than 0.7 (Chin, 1998) and exceed the related inter-construct correlations for reflective constructs. All the square roots of AVE are greater than the related inter-construct correlations. Construct validity, composite reliability, convergent validity, and discriminant validity are described above and all the criterion are met for further data analysis (Table 1).

Outcome Performance Variables

Financial performance was determined by two measures: net patient revenue and operational profit margin. Net patient revenue is defined by deducting contractual allowances (Weech-Maldonado et al., 2003):

Net patient revenue = Log (Net patient revenue/number of residents)

The operational profit margin included the core business operations which removed the influence of nonoperating revenue:

Operational profit margin = (net patient revenue – operating expense)/net patient revenue

Operational efficiency was assessed by two measures: operating expenses and total salary:

Operating expenses = Log (Operating expense/number of residents)

Total salary = Log (total salary/number of residents)

Control Variables

Environmental control variables are associated with the level of competition in the local nursing facility market which might affect both quality and financial performance. The Herfindahl-Hirschmann index (Liu et al., 2010) and urban location (Davis et al., 2011) can be applied in order to balance the degree of market competition. A highly-competitive environment might decrease performance due to more competitors constraining the available capacity of the environment. The Herfindahl-Hirschmann index (HHI) is a measure of competition in the local market of nursing home beds with scores ranging from 0 to 1, whereas 0 represents perfect competition and 1 signifies a higher concentration with less competition. The urban population is based on a community size of 50,000 or more. The total population of each city is used as one of the control variables (Weech-Maldonado et al., 2003). Thus, both HHI and urban location will be used for the data analysis for quality management and outcome performance.

Statistical Analysis

Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis is utilized for Hypothesis 1 to Hypothesis 5. PLS-SEM was originally introduced by Wold in the 1960s. Later, Chin (1998) regenerated this technique in the information systems area. PLS is a structural

equation modeling (SEM) technique which constructs a vector of coefficients to associate a group of independent variables with a group of dependent variables (Hair et al., 2012). As there are no strict normality distribution assumptions for the data, both reflective and formative constructs can be modeled within the same study (Chin, 1998; Hair et al., 2012). In many instances, health care financial data from CMS (i.e., net patient revenue, operational profit margin, operating expense, total salary) are not normally distributed; hence, PLS-SEM is a preferred structural analysis technique for our data analysis. The bootstrap procedure, involving 200 and 500 times of resampling, is applied to obtain the path coefficients, t-statistics, and 95% confidence interval.

RESULTS

From the PLS-SEM results, *outsourcing strategy* have a significant positive relationship ($p < 0.01$) with *quality management* (H1) but no significant relationship was identified between *outsourcing strategy* and *financial returns* (H2). However, *outsourcing strategy* was linked with *operational efficiency* (H2). This finding suggests that a suitable outsourcing strategy could reduce operational expenses. Next, *outsourcing strategy* and *outsourcing trust* (H3) has a significant positive relationship ($p < 0.01$). Additionally, *outsourcing trust* (H4) have a significant positive relationship with *quality management* ($p < 0.01$). Finally, outsourcing trust indicates a positive relationship with financial returns (H5). Conversely, outsourcing trust demonstrations a significant relationship with operational efficiency (H5). However, this association shows that firms which maintain higher outsourcing trust with the customer would require higher operational expenses. Table 2, Summary of Hypothesis Tests contains the results of the structural model with coefficients, t-statistic and 95% confidence interval to estimate whether the hypotheses tests are positively or negatively supported.

Table 2. Summary for Hypothesis Tests

		PLS result		
		Coefficient	T-stat.	95% Confidence interval
H1	Out. Strategy → Quality Mgmt.	0.196	2.548***	(0.073, 0.314)
H2	Out. Strategy → Finance	-0.073	1.144	(-0.181, 0.033)
H2	Out. Strategy → Oper. Eff.	-0.100	1.735**	(-0.205, -0.021)
H3	Out. Strategy → Out. Trust	0.306	4.122***	(0.190, 0.426)
H4	Out. Trust → Quality Mgmt.	0.314	3.931***	(0.183, 0.448)
H5	Out. Trust → Finance	0.095	1.671**	(0.001, 0.189)
H5	Out. Trust → Oper. Eff.	0.082	1.427*	(-0.010, 0.184)

* p<.10, **p<.05, ***p<.01

The R^2 of endogenous constructs in Table 3 are 0.175, 0.078, and 0.048 for *quality management*, *financial returns*, and *operational efficiency*, respectively. Therefore, with the exception of *quality management*, these constructs do not appear to be very strong based on Chin (1998).

Table 3. Results of R^2 and Q^2 Values

Endogenous Latent Variable	R^2 Value	Q^2 Value
Quality Management	0.175	0.090
Financial Returns	0.078	0.038
Operational Efficiency	0.048	0.037

The control variables, Herfindahl index and urban location display various results for dependent variables – process management, operational efficiency, and financial returns. Both financial returns and operational efficiency are negatively related to the Herfindahl index which means that less competition will decrease financial returns and operational costs. Urban location demonstrates that a negative relationship exists between operational efficiency and financial returns. When the nursing facilities are located in an urban area, these facilities will have higher operational expenses but they also will obtain higher financial returns.

As with any endogenous predictor constructs, the impact of outsourcing strategy and outsourcing trust is assessed with the size of the R^2 values and calculated to reflect the effect size of Cohen's f^2 (Cohen, 1988; Hair et al., 2012). The results of f^2 effect size is presented in Table 4. Cohen (1988) stated that values of 0.02, 0.15, and 0.35 are considered small, medium, and large, respectively. The f^2 effect size for the predictive value of *outsourcing strategy* on quality management is 0.034, which indicates that *outsourcing strategy* has a small effect in producing the R^2 for *quality management*. The f^2 effect sizes for the predictive value of *outsourcing strategy* and *outsourcing trust* on *financial return* are 0.0054 and 0.0054, respectively, which are considered relatively small effect sizes. By evaluating the magnitude of the R^2 value as a criterion of predictive accuracy, Q^2 value suggests the model's predictive relevance. $Q^2 > 0$ shows the model has predictive relevance (Hair et al., 2012). PLS-SEM blindfolding for all endogenous latent constructs offers the output for Q^2 values (Table 3). The predictive relevance Q^2 of quality management has a value of 0.090, which indicates that our model has small predictive relevance for this construct. Also, Q^2 values are greater than 0, indicating acceptable predictive relevance. The q^2 effect size (0.0429) for the predictive relevance of *outsourcing trust* on *quality management* indicates that *outsourcing trust* has a small effect in producing the Q^2 (predictive relevance) for *quality management* (Table 4).

Table 4. Summary of Results – Path Coefficients, f^2 and q^2

	Quality Management			Financial Returns			Operational Efficiency		
	Path Coefficient	f^2 effect size	q^2 effect size	Path Coefficient	f^2 effect size	q^2 effect size	Path Coefficient	f^2 effect size	q^2 effect size
Out. Strategy	0.196	0.034	0.0143	–0.073	0.0054	0.0000	–0.100	0.009	0.0052
Out. Trust	0.314	0.089	0.0429	0.095	0.0054	0.0010	0.082	0.0052	0.0020

CONCLUSION

The predominant reason for outsourcing in healthcare is cost savings. As US long-term care facilities rely on Medicare and Medicaid reimbursements, outsourcing might be a method of cutting operational costs and increasing financial performance without affecting patient care. In the healthcare industry, strategic outsourcing can be effective, especially for long-term

healthcare facilities. Healthcare administrators must understand outsourcing strategy and how to establish relationships and develop trust with vendors over time.

Our results show that outsourcing will not negatively affect the quality of patient care. Furthermore, our findings indicate that SNFs can reduce operational costs by implementing strategic outsourcing (e.g. information technology or outsourcing strategy plans). Outsourcing strategy can also lead to a strong relationship with vendors when building trust between two partners. Over time, outsourcing trust with vendors leads to higher financial performance, but the results did not reflect reduced operational expenses. Evidently, time and effort/expenses are necessary to build relationships and establish trust between two parties; eventually, this effort will be reflected in improved financial returns. The bottom line is that long-term care facilities should carefully assess the impact of outsourcing on patient care and financial performance before deciding to outsource their services. Also, firms should evaluate the vendors' capabilities and potential risks before selecting the final outsourcing partners.

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Business Intelligence, Analytics and ERP training

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Abstract

Business Intelligence (BI) and analytics continues to be one of the fastest growing areas for businesses (DeAngelis, 2015). One of the top ten skills that employers want their new college graduates to have is the ability to analyze quantitative data (Adams, 2014). BI and analytics were predicted to be the number one investment for CIOs in 2015 (Richardson, 2015). Organizations are actively recruiting students with analytical and business intelligence skills but having difficulty finding candidates with Enterprise Resource Planning (ERP)/analytical and BI skills... For these reasons, many Universities are adopting ERP systems that have BI and analytic components into their curriculums. However, ERP systems can be challenging to set up, operate and teach. This in-progress research investigates methods of teaching ERP systems using hands-on and collaborative approaches. Qualitative and quantitative methods will be used to evaluate the methods discussed in this paper. The results will be used to propose possible best practices.

ERP/Business Intelligence (BI) and analytics skills are widely sought after skills by a vast number of employers in the current job market. BI continues to be one of the fastest growing areas for businesses (DeAngelis, 2015). One of the top ten skills that employers want their new college graduates to have is the ability to analyze quantitative data (Adams, 2014). BI and analytics were predicted to be the number one investment for CIOs in 2015 (Richardson, 2015).

Enterprise Resource planning systems (ERP) s which also include business intelligence tools, integrate various business functional areas using a shared database across the entire organization. Some of the functional areas involve: accounting, finance, customer relationship management, human resources, sales and manufacturing. It allows for reporting and analysis of business data.

ERP systems can be valuable to organizations in many ways. For example, they can provide increased efficiency and productivity (Hitt et al., 2002). However, the implementation, training and use of ERP/business intelligence systems can be complex and challenging. The challenges address the need to use and understand the technology and the theories as well as organizational and socio-technical issues and concerns.

Academic institutions are increasingly recognizing the need to adapt their curriculums to include ERP/BI courses. This training will enable students to be prepared to compete in job markets that are increasingly seeking students with ERP/BI skills. ERP training can be challenging due to the different types of skills and knowledge that are required. After a review of literature, there is limited knowledge on setup considerations and effective methods for training students in the various areas of ERP/BI. This in- progress research investigates ERP setup considerations and methods of teaching ERP systems in order to develop best practices for teaching ERP systems. In the following sections, an overview of ERP setup and teaching considerations and methods are presented.

Considerations in Setting up ERP systems:

In considering an ERP system, one of the first considerations is the development of an ERP plan with goals/objectives for the ERP system for the academic institution. It is important to identify answers to questions such as: what you want to achieve; who will use the system; what courses will be taught; what are the costs that are involved; what are the expected student outcomes; how will ERP enrich the curriculum (Watson & Schneider, 1999).

Some possible objectives for an ERP program may include: Increased competitive advantage for students and university; hands on, real world training opportunities; ERP research

opportunities and development of a cross-functional, multi-disciplinary curriculum throughout the University.

ERP systems can be expensive and there may be academic-based cost saving opportunities. . For example, academic institutions may be able to join academic-based ERP programs such as the SAP University Alliance which can help to minimize academic expenses (Watson & Schneider, 1999). Another consideration for the ERP program is whether it will be offered in one particular academic curriculum such as Management information systems or will there be a cross-functional curriculum that services several departments.

Watson & Schneider (1999) indicate that an ERP system for an academic environment can be challenging and suggest considering the following critical success factors:

CRITICAL SUCCESS FACTORS

- Early planning is important and should take into account critical success factors. ERP will require a significant amount of time and resources to install and implement
- Executive commitment from top ranking administrators is important with executive sponsorship.
- ERP Faculty team with faculty dedicated to learning and using the system. This is important for curriculum development.
- An ERP Industry Advisory Group with industry ERP experience in their company will be helpful.
- A faculty training program where faculty get all of the necessary ERP training, knowledge and information. An in-house study group should collaborate and communicate by sharing information and ideas.
- A physical facilities plan helps by making sure all the necessary computer-based resources are provided such as :(computer hardware, networks, communications, etc.).
- A pilot implementation would help work out initial problems before students use the system.

Examples of hands on methods (early programs) from Watson & Schneider (1999) included:

1. Use of Internet Surfing through the development of a relationship with an ERP vendor so that the academy had access to online business information.
2. Intranet Surfing using ERP systems where students study how processes work such as transaction processing.
3. Role playing -students learn about business concepts through experiential learning using a business script to simulate business processes and activities.
4. Goal Seeking provides the students with a goal or objective such as creating a report or identifying a problem and the student must find a solution using exploratory, investigative and analytic skills and pattern identification to come up with a solution. . Business scripts are not required to conduct business activity.
5. Other activities might involve simulations and role playing as system administrators or consultants where students use the ERP system to help monitor the business processes and models and produce reports. The students might also look at the business ERP system for best practice analysis.
6. Students might also use ERP tools to create an ERP system from beginning to end from requirements analysis to full implementation.

Some of the ERP systems relate to activities in the following areas:

1. Data Warehouse: Activities relate to database design and operation and solutions to database problems.
2. Supply Chain Management and Optimization: Students study supply chain problems relating to optimization and efficiency and examination of how the supply chain works
3. Electronic Commerce and Internet-based Application Development:
4. Simulations of ERP systems – looking at business processes and efficiencies
5. Business analytics --- analyzing what has happened and making predictions

Training method using triangle model of teaching:

The triangle training method takes into account the complexity and challenges associated with ERP/BI training. This framework was developed over time and involved an iterative process which resulted in a teaching model. The framework takes into account many pedagogical principles. There are three learning contexts: classroom, lab and organizations. The students were assigned to teams where the majority of the learning would take place. The hands-on assignments were used to work on organizational configuration issues. The students were also required to prepare papers and summaries of case studies and present their work. This was used

to help with reflection and learning through reflection on topics discussed in class (theory and organizational learning) as well as hands on lab assignments.

Methodology:

The previous methods and techniques will be used to develop an ERP curriculum and training methods. Qualitative and quantitative methods will be used to evaluate the effectiveness of different activities in a cross-functional ERP system. The results will be used to propose best practices.

Conclusion:

As the need for ERP/Business Intelligence (BI) and analytics skills continues to expand, it becomes important to for academic institutions to address this need by incorporating ERP course into the curriculums. This will ensure that students are prepared for the competitive job markets as they prepare for their careers. Training in ERP courses can be very complex and challenging. Students must be able to understand organizational, technical and sociotechnical aspects of learning. This in-progress paper has provided a first look at methods and practices to consider when setting up ERP and teaching ERP courses. Continued research will use this information to setup ERP courses and conduct qualitative and quantitative research to evaluate the methods and propose best practices. Future studies could evaluate practices in different countries using different modules and different BI and ERP processes.

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CAN EXTENSIVE USE OF TECHNOLOGY BE AN EFFECTIVE MEASURE OF CRITICAL THINKING SKILLS?

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ABSTRACT

Since 2006, the unemployment rate in the United States has ranged from the mid 4% range to the upper 9% range. As rates ease downward jobs are created and filled. Organizations filling positions have several desires in common when it comes to hiring their employees. Strong critical thinking skills are one of the top attributes desired, but one of the hardest to determine, most costly to assess, and one that takes a great deal of time to measure if assessed accurately. Universities and other educational organizations suffer the same symptoms measuring critical thinking skills in students as they progress through degrees and programs (ie have students gained necessary critical thinking skills to prepare them for the future?).

Large players participating in the space of critical thinking assessment are ETS (HEIghten Exam for Critical Thinking) and the Collegiate Learning Assessment (CLA). These assessments require a significant amount of time to measure critical thinking (assessment time and lead time to receive final grades), can be costly, and because they are language based, can be subject to bias in testing. Technology is used by both ETS and the CLA on the "frontend" to assess critical thinking and provides a conduit for test-takers to take and submit the ETS and CLA exams.

The purpose of this writing is to examine the validity of utilizing more extensive use of technology in assessing critical thinking. Specifically, we will explore, examine, and validate a new critical thinking product that goes beyond the "frontend" of critical thinking assessment, delivering "backend" scoring, calculation, and determination of results as well as communication immediately upon completion, to both the test-taker and organization.

Credit Perceptions and Participation in Mainstream Banking

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Credit Perceptions and Participation in Mainstream Banking

Abstract

This study analyzes credit perceptions in the United States and how these might impact participation in mainstream banking efforts. We use data from the 2015 FDIC National Survey of Unbanked and Underbanked Households to help us determine how individuals finance themselves and what factors impact these processes. The initial data evaluation provides greater insight into why individuals might be hesitant to seek out loans and how their perceptions of their personal credit situations might impact their willingness to seek out mainstream financing. Our findings indicate that individuals that are relatively unbanked or underbanked rely heavily on the use fringe financial services (payday loans, rent-to-own, etc.). This is largely due to convenience, cost, credit issues, personal feelings about banking systems, and a general lack of knowledge of how banking systems work.

Policy makers, financial institutions, and government agencies have begun to take note of the gap between the underbanked (those that use fringe financial services), the unbanked (those that don't have a checking/savings account), and the banked (those that are active participants in mainstream banking). The Federal Reserve and the Federal Deposit Insurance Corporation have both conducted numerous studies to come up with definite numbers for the financially underserved.

The reasons why certain segments of the population remain unbanked have been gathered in general public forums, focus groups, and some regional and national surveys. The primary reasons referenced have to do with language barriers, improper documentation, preconceived notions about the banking system, and cost prohibitive banking fees and policies (Sherraden, 2010, Titania, 2012, Kolakowski, 2010, Vermilyea and Wilcox, 2002, Thomas 2010). In this study, we attempt to not only come up with a numerical account of the unbanked and banked in

the United States, but to also understand the reasons behind why so many do not participate in mainstream banking.

Conceptual Issues

Unbanked individuals are often referred to as financially excluded. This situation is one whereby individuals cannot obtain financial services, i.e. those with limited access to financial products or services are deemed to be financially excluded (Collard et al, 2001).

Causes of financial exclusion vary from limited access to financial services, racism, insufficient marketing efforts, affordability, financial illiteracy, mistrust of financial institutions, and language and cultural barriers (Kempson et al, 2000).

Financial exclusion can be subdivided into five major categories. Access exclusion occurs when someone is deemed too risky to gain access to certain financial services. Condition exclusion occurs when the conditions required by some financial products or services make them unobtainable for certain individuals. Price exclusion refers to the inability to obtain certain financial products or services because of limitations imposed by the costs associated with those services. Marketing exclusion happens when individuals are unaware of the financial services and products available to them because of a lack of marketing efforts on behalf of financial institutions. Finally, self-exclusion occurs when people willingly opt out of mainstream finance because of prior experiences or preconceived notions (Kempson et al, 2000).

As evidenced, in some cases, financial exclusion is an imposed or involuntary exclusion where lenders choose to avoid certain groups or individuals. This avoidance is not one due to hatred or prejudice, but instead, a more direct result of statistical discrimination. Statistical discrimination in the lending industry occurs when an individual is deemed uncreditworthy because of a correlation to their racial or ethnic background. Lenders may use race/ethnicity as a

proxy for credit worthiness, not in a prejudicial fashion, but as a way to circumvent a more detailed assessment of default likelihood. For example, a lender may perceive that a minority borrower may have a higher likelihood of default because they may have less job security than non-minorities on the whole. This type of discrimination can be evidenced even when minorities and whites are equally creditworthy (Longhofer, 1995). Statistical discrimination often arises from preconceived stereotypes, and not necessarily from a dislike or prejudice toward a certain group. The stereotype is usually based off of a group's average behavior. (Arrow, 1973, and Phelps, 1972).

Our study focuses on the other case in which financial exclusion is voluntary (Hannam, 2009). We are concerned with why individuals choose to avoid mainstream banking out of their own accord.

Literature Review

About 25% of low income households in the United States are unbanked. These unbanked tend to be unmarried, young, less educated, minorities, and less wealthy (Sherraden, 2010). Indeed, research on the unbanked general population has found that the unbanked tend to include those with low incomes, less education, the young, immigrants, and female head of households (Beard, 2010). Another study also concluded that income, home ownership, spending habits, age, race/ethnicity, education and employment are all significantly associated with an unbanked status (Vermilyea and Wilcox, 2002).

Some of the unbanked have stated that the lack of bank proximity, inconvenient hours, expensive nature of banking services, or insufficient funds that do not require a bank account have kept them from entering the mainstream banking arena (Sherraden, 2010). The unbanked have disclosed that maintenance fees, distrust of the banking system, and insufficient funds have

contributed to their financial exclusion (Vermilyea and Wilcox, 2002). Titania finds similar results; the unbanked shun mainstream banking because of the high fees some of these banks impose. They also may have bad credit histories that have evolved as a result of the economic downturn in recent years (Titania, 2012).

In its recent National Survey of Unbanked and Underbanked, a supplement to the U.S. Census Bureau's Current Population Survey started in 2009, the FDIC found that the number of unbanked in the country stands at about 7%. These individuals usually have low incomes, limited educational backgrounds, and are younger (Kolakowski, 2010). The survey included 47,000 respondents and deemed unbanked those that had no checking or savings account.

Reasons among this group for remaining unbanked included insufficient income, high banking fees, language barriers, distrust of banks, improper documentation, inconvenience, credit issues, and financial illiteracy. Not surprisingly, many of the unbanked also used money orders, check cashing services, payday loans, rent to own, pawn shops, and tax refund anticipation loans (Kolakowski, 2010).

Preliminary Results

In the initial assessment of the 2015 Survey data, we find that 7% of households surveyed are unbanked, and about 19.9% are underbanked. About 68% of all households surveyed are deemed to be fully banked (have a checking or savings account and have not used fringe financial services in the past 12 months). The majority of individuals that fall under the unbanked and underbanked groups tend to also be lower income households, less educated households, and minority households. The primary reasons given for being unbanked were insufficient money to warrant an account, a need for privacy, a lack of trust in the banking system, and high banking fees.

Amongst the underbanked population, we found that almost 10% of households used prepaid cards. The majority of those using prepaid cards were low income households, less educated households, and minority households. Another fringe financial service commonly used by these same individuals is money orders.

Further Research

The next step in our study will be to compare the FDIC's 2015 Survey findings with those from 2013, 2011, and 2009 to determine what trend (if any) is present with regard to how US households are financed. We want to continue to understand why segments of the population are unbanked/underbanked, what factors lead to these designations, and how the use of fringe financial services is impacted by certain demographic characteristics.

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CURRENT STATE OF RUSSIAN BUSINESS EDUCATION

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ABSTRACT

In this study we review some important changes in Russian business education in the last two decades. First, we discuss the organization of the Russian academia in general and its influence on the country's business education system, and then how these peculiarities have affected the structure and the content of Russian business programs. Russian business education in the past traditionally overemphasized technological and logistical issues at the expense of managerial and financial matters, and some areas like marketing or human resources were presented at rudimentary levels. That heritage explains many current problems and trends in Russian business education today.

The recent development of new Russian business education has passed through three major periods since the beginning of market reforms in 1990s.: the initial skyrocketing rise in demand, popularity, and quantitative growth during the first decade of transformation; the first correction and restructuring phase since economic crisis in 1998; and substantially more matured state in the last 6-8 years, coincided with another economic downturn in 2008. The authors discuss the dynamics, specifics, and structural changes in Russian business education in all these three phases of the development.

The study overviews the existing problems of business education in Russia, including meeting new higher academic standards, adopting new pedagogical practices, adapting to new demographic realities and declining enrollments in Russian business colleges, developing new business continuing education and master programs, overcoming geographical imbalance, and expanding cooperation with foreign peer institutions.

Finally, authors discuss a new role of Russian business education in the current economic and political development of Russia. Russian transition to market economy is not a finished process. These days Russia lags behind many other emerging markets because of high monopolization of its economy, excessive state regulation, rampant corruption, outdated business legislature, and vague property rights. Business academic community can and should start playing more active role in handling these problems and becoming real agent of change in Russian society.

Curriculum Revision to Address a Changing Healthcare Environment

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Health care reform, the Affordable Care Act, and changes in the U.S. health care system have necessitated modifying the scope and content of existing courses in the health care management curricula at Lander University. Lander is a university in upstate South Carolina with an enrollment of about 2500 students that has remained stable for some time. The HCMT enrollment in the Lander school of management represents approximately 25% of the total enrollment for the School of Management. Recently, deficiencies in the quality of patient care, as well as patient safety issues, have led to calls for change in health professions education by healthcare organizations and the Institute of Medicine (IOM) (Berwick, 2002). The foundation for any proposed curricular revision or changes in teaching practices must be firmly grounded in a comprehensive review of the literature and input from students, alumni, and the professional health care community. The recent literature in the field and input form stakeholders will assist faculty with the curriculum evaluation and revision process. The process for curriculum change in the Lander University health care emphasis is described in this article.

Key Words: Healthcare Reform, Affordable Care Act, Curriculum, Healthcare Emphasis

Introduction

The Lander University School of Management Bachelor of Science in Business Administration provides an emphasis in Health Care Management which prepares students for careers working in the public sector with healthcare systems. Students enrolled in the Healthcare Management emphasis are challenged to identify and provide solutions for the unique problems and issues facing healthcare organizations today. The four-year curriculum gives student a broad base of knowledge and skills and was designed to help students gain the necessary general

business, analytical, communication, and management competencies needed for professional jobs in the field of healthcare management. The curriculum for this emphasis has not been reviewed or changed in several years and needs to encompass the changing demands of a healthcare system that has undergone drastic change within the last six years. Any curriculum revision process is well served to examine the trends in health administration programs. Curriculum revision is either being considered or is in process in many health care management programs across the country in response to the dynamic changes occurring in the health care industry. The process used by Lander for this curriculum review include researching the AUPHA requirements for accreditation, a curriculum mapping process to determine how much of these requirements are already being met, a comparison of the Lander program to others in the state and region, a survey of alumni and the healthcare professionals and preceptors in the internship program, a literature review of trends at the national level in undergraduate education in healthcare administration and developing a plan for curriculum transition.

According to Dr. Don Berwick, the *Quality Chasm* report which calls for improvements in six dimensions of health care performance: safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity; asserts that those improvements cannot be achieved within the constraints of the existing system of care. The report provides a rationale and a framework for the redesign of the U.S. health care system at four levels: patients' experiences; the "microsystems" that actually give care; the organizations that house and support microsystems; and the environment of laws, rules, payment, accreditation, and professional training that shape organizational action, many of these redesign initiatives have been implemented since Berwick's article in 2002 through the Affordable Care Act (Berwick, 2002).

The Affordable Care Act (ACA) has changed the landscape of health care delivery, expanding health care coverage and making it affordable to more Americans. The last five years has been spent restructuring health care delivery, executing new strategies to improve health care quality throughout the system, and working to slow the rising cost of health care. The ACA has created value based purchasing systems to hopefully replace fee-for-service, generated an increase in risk sharing such as bundled pricing, shared risk contracting and capitation and also implemented a movement towards clinical integration and healthcare systems such as Accountable Care Organizations (ACOs), Physician Hospital Organizations (PHOs), and Independent Physician Associations (IPAs). New skills and competencies are needed by health care administrators to function successfully in a vertically integrated delivery system. These competencies include management skills across hospitals, ancillary providers, physician practices, ambulatory settings, risk management skills, and skills in quality. The healthcare industry is also moving away from procedure based fee-for-service medicine toward prevention and wellness and population management (Love & Ayadi, 2015). Many health care administration programs across the county are struggling to adapt curriculum to prepare students to succeed in this dynamic environment.

The healthcare managers of today must have management ability superior enough to parallel the increased complexity of the healthcare environment. Academic health care management programs must produce graduates able to match these demands. The Healthcare Leadership Alliance (HLA), a consortium of six major professional membership organizations, used the research from and experience with their individual credentialing processes to posit five competency domains common among all practicing healthcare managers: (1) communication and relationship management, (2) professionalism, (3) leadership, (4) knowledge of the healthcare

system, and (5) business skills and knowledge (Stefl and Bontempo, 2008). Curriculum for the 21st century managers should consider the development of these competencies when changing curriculum.

The only thing that appears certain is the need for change, however, academia may be even more resistant to change than other segments of society, as academics often feel protective of their courses and consider the content and delivery as a part of their academic freedom. Changing the focus from curriculum revision to a process of transitioning to new conditions, rather than change, may help faculty become more willing to consider all activities needed to develop a new curriculum for the 21st century.

In 2012, a Harvard professor named Regina Herzlinger conducted interviews with 58 leading global health care sector CEOs about their future needs. The CEOs wanted people who could solve problems, work as part of a diverse team, understand and learn from failure, manage change, and innovate through processes, systems, and organizations. The words they used most were leadership, change, and innovation. Both undergraduate and graduate programs in healthcare management have the daunting task of providing curriculum that adjusts to the dynamic healthcare environment and provides students with the skills that prepared them for the challenges of the twenty-first century healthcare environment. Herzlinger's " comparing the feedback from academics and CEOs who attended several conferences revealed that one of the areas of strongest agreement between our academic conferees and the CEOs interviewed was that modern health care needs innovation in processes and systems more than it needs new inventions". Herzlinger commented that a chair/CEO of a health care cost-effectiveness company stated that, "Innovation, in our world, is not going to be necessarily about the thing, it is going to be about the way you do it. Although we make some products, it is largely a service business and

that means innovating around services is just as powerful." Professor Herzlinger also stated that a related point of agreement in her study was the importance of the ability to solve problems and improve performance across a range of business processes. Though traditional classroom teaching continues to offer a great deal of value according to the study results, the responses of both CEOs and academics reflect the strong belief that other modes of learning and teaching are required. Healthcare management programs should continue to pursue and improve classroom-based pedagogical strategies, but project-centered education, field study, and mentorships offer invaluable real-world experience and respond directly to the CEOs' request for more practical education (Shetty & Bagali, 2015).

The foundational competencies that any curriculum change should include have received a great deal of research in healthcare administration graduate programs. And even though competency-based program assessment has become a fundamental part of the accreditation process for graduate health administration, as well as a method for program assessment by deans and department directors, undergraduate competency based curriculum has not been widely investigated or implemented. However, curriculum changes that focus on preparing students for work in the 21st century healthcare system should be mindful of providing opportunities to develop the competencies to meet market demands. The focus on measurable outcomes and competencies did not happen quickly. The general acceptance of evidence-based medicine was a natural antecedent to an evidence-based approach to healthcare management (Kovner and Rundall 2006). Competency-based assessments can be employed to pinpoint specific program strengths and weaknesses in order to make program changes to ensure students are adequately prepared to enter the field. (Stifl & Bontempo, 2012). The insight provided by this study and

others concerning issues to consider in developing appropriate curriculum changes warrants consideration in Lander's process.

According to Sylvia Burwell, the Secretary of the Department of Health and Human Services (HHS), efforts have already been initiated to bring about these changes, with intentions to augment reform in three important and interdependent ways: providing incentives to motivate higher-value care, by tying payment to value through alternative payment models; and by altering the delivery of care through greater teamwork, integration, and more effective coordination of providers across settings. Additionally, there will continue to be the call for greater attention by providers to population health; and by also harnessing the power of information to improve care for patients. These changes in the way health care is delivered in the United States necessitate a review of the knowledge base necessary to be adequately prepared for these dramatic shifts in the healthcare system. Healthcare Administration authors cannot be counted on to produce text books that provided a didactic contribution that will publish changes quickly enough to provide a comprehensive understanding of the present dynamic nature of the industry. Successful programs must diligently monitor the industry to remain current.

In addition to the research and work concerning the competencies (usually directed to graduate students) health care managers need to be successful, the accrediting body for Health Care Administration Programs, the Association of University Programs of Healthcare Administration (AUPHA), has authored a Body of Knowledge whose purpose is to delineate the content that students in health management programs should learn during the course of their study. According to AUPHA, the Body of Knowledge differs from competencies in that it refers to the knowledge base, or content, rather than the student's ability to demonstrate skill in use of

the content. It assumes that competency in application requires a basic knowledge of facts, theories and analytical approaches. The Body of Knowledge is distinct from accreditation requirements of CAHME or CEPH in that it encompasses detailed subject matter in addition to broad topics. This Body of Knowledge is used as a guide in the Lander curriculum revision process in order to assure that the curriculum in Lander's program is adequate to AUPHA recommendations. The final phase of the process will be review of the curriculum mapping process, and summarizing the data gathered from program comparisons, alumni and health care professional and preceptors, and the development of a plan for curriculum change using all this research. The curriculum mapping process, which is the last piece before plan development will be completed Fall of 2016. Recommendations based on the above process will be given to the curriculum committee by Spring 2017.

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An Interdisciplinary Approach to Cybersecurity Curriculum

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Abstract:

Current media has many stories of cyberattacks on the global financial system. The system is inter-related and inter-dependent. Attacks on a single institution in one country can have major economic impacts throughout the world.

In the United States, a voluntary risk-based Cybersecurity Framework was developed for all industries. The Framework is a set of industry standards and best practices to help organizations manage cybersecurity risks. The Framework was a collaborative effort between government and the private sector. The Framework avoids placing additional regulatory requirements on businesses.

The Framework recognizes that organizations in various industries will continue to have unique risks – different threats, different vulnerabilities, different risk tolerances, and implementation of the best practices set forth in the Framework will vary. The Framework is a living document that is updated and improved as there is feedback on its implementation.

We used the framework to design a curriculum and develop courses for a doctoral program in Cybersecurity. The courses are spread among the areas in the Cybersecurity Framework, and course competencies and learning objectives are derived from specifications in the Framework.

This paper will describe how we plan to bring interdisciplinary aspects into the curriculum, while following the framework. In this paper, we focus on coursework in Accounting and Finance. We also prescribe a series of courses in research for cybersecurity, in which students could focus on Accounting and Finance issues if that is a career path they plan to take.

Distance as a Determinant of Trade Costs: A Different Type of Distance Puzzle?

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Abstract

Employing a gravity model approach and using recently released estimations of trade costs between nations, we present confounding results that demonstrate a new "trade-cost-distance puzzle." Using data from 1995-2012, we examine the influence of various determinants of trade costs, including the distance between trade partners. While the estimated coefficient on the distance variable is positive as expected, we show that the distance between countries has an increasing influence on trade costs over time, which runs counter to intuition regarding the effects of globalization. These results hold whether the estimation is performed using annual cross sections or using an iterated distance variable. Proposed solutions to the more traditional "distance puzzle" in international trade literature, including balancing the data, mitigate the severity of increasing effects of distance on trade costs, but do not solve this new puzzle.

Keywords: International trade, Trade costs, Distance puzzle, Gravity model, Imports.

JEL Classifications: F14, F60.

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DO BUSINESS SCHOOL TEAM PROJECTS MEET STUDENT LEARNING OUTCOMES AND PREPARE STUDENTS FOR THE WORLD OF WORK?

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ABSTRACT

The new AACSB standards have brought change to the definitions of Student Learning Outcomes (SLOs). One of the key questions for business schools raised by these changes is: why are team projects important? Typically, schools of business are not focused on educating theorists or academics, but rather on future practitioners who will work in businesses that have structured and unstructured teams. If team work in the "real world" is so important, then teamwork in business classes must add value; otherwise, the business school fails in its mission. It is important for business schools to recognize the opportunity to utilize teams as a teaching tool that can be assessed effectively. However, the teamwork experience must have value beyond the classroom; otherwise, the quality and capability of graduates is not enhanced.

Background

In the AACSB Assurance of Learning Standards: An Interpretation AACSB White Paper No. 3 issued by: AACSB International Accreditation Coordinating Committee AACSB International Accreditation Quality Committee 20 November 2007 and Revised 3 May 2013, example Learning Goals are defined. The following were included in those examples:

Learning Goal: Our graduates will be effective communicators.

The corresponding objectives for the goal are:

1. Our students will produce professional quality business documents.
2. Our students will deliver a professional quality presentation accompanied by appropriate technology.
3. Our students will demonstrate effective interpersonal communication skills in a team setting.

As a consequence of this change in standards, an outcomes assessment must be devised to assess student success in these learning outcomes.

According to the AACSB Assessment Resource Center, the outcomes assessment process should include:

1. Definition of student learning goals and objectives
2. Alignment of curricula with the adopted goals
3. Identification of instruments and measures to assess learning
4. Collection, analysis, and dissemination of assessment information
5. Use of assessment information for continuous improvement including documentation that the assessment process is being carried out in a systematic, ongoing basis (AACSB Assessment Resource Center, 2007).

This panel is concerned with effective implementation and assessment of the new AACSB Standards (2013) Standard 9 as it relates to team projects.

Equipping Students to Deal with Problems in Teams

Some of the traditional problems students have in teams include team formation and function including the following issues:

Goals, purpose, and mission: What are the team's goals? What is the team's purpose and/or mission? How well do the team's goals support the organization's mission and goals?

Roles and responsibilities: Who will play what roles and be responsible for what tasks? How will team members be aided and held accountable for their responsibilities? How will the team assume collective responsibility for its work?

Relationships: How will relationships be formed and maintained within the team? How will relationships be managed with individuals and groups outside the team? How will the team find the time to form supportive relationships while working on its assigned tasks?

Leadership: Who will lead the team? How will leadership roles be shared or rotated? Who will facilitate the team meetings?

Power and influence: Who has authority over and influence upon the team? How is this authority and influence exercised? How do team members react and respond to those with power and influence? How do members influence the team? How does the team influence powerful individuals and groups outside the team?

Skills: What mix of skills is needed to do the team's work? What technical or functional skills are needed? What problem-solving and decision-making skills are needed? What interpersonal skills are needed?

Communication: How will team members communicate with one another? What communication processes and systems will be used? How will the team communicate with individuals and groups outside the team?

Problem-solving and planning methods: What problem-solving and planning methods will the team use to do its work? What methods and processes will the team use to conduct its meetings?

Conflict: How will the team manage disagreements and conflicts?

Progress and results: How will progress and results be measured?

Risk and rewards, successes and failures: How much risk is the team allowed to take? What rewards will the team receive for its results? How will the team handle successes and failures?

Creativity and innovation: In what sense does the team see its role as being creative? What brainstorming and problem-solving processes will the team use to create innovative ideas and alternatives?

Motivation: Why do members want to be on the team? What do team members gain personally from membership? How can team members help the team? How can they be involved in and challenged by the work the team is doing? How does the team help to motivate its members?

Celebrations: How will the team celebrate its ability to work as a team and the results it achieves?

The panel will address each of these issues.

Non-traditional problems include how to deal with problem team members:

- Hitch Hikers
- Couch Potatoes
- Lone Wolves
- Powerful Members

The panel will address ways to deal with these problem team members that can be used in coaching teams.

Assessing Student Engagement through Peer Evaluations

Why do students hate peer evaluations and remain unengaged in team projects? The answer may be that students do not understand how they will be evaluated by their peers. It may also be that qualitative evaluations are more valuable in student teams than are quantitative (rating) evaluations.

The panel will address this issue.

Student Reactions to Team Projects

Why do students say they hate working in teams? A survey at San Jose State University found that 72 percent of instructors in the business school assigned students to team projects in at least one class, but 81 percent gave modest, limited, or no support to students assigned to teams. Unfortunately such lack of support may be typical (Bolton, 1999).

The panel will address this problem in business school teams.

Do Team Projects Prepare Students for the World of Work?

Several of the panelists have long and successful backgrounds in operating business teams. They bring perspective and solutions in all discussions concerning student team problems and solutions.

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IS THERE A PLACE FOR MINDFULNESS IN BUSINESS ORGANIZATIONS?

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ABSTRACT

The purpose of this paper is to examine mindfulness and its role in business organizations. First mindfulness will be defined. A summary of the benefits of mindfulness will be offered. A list of some of the business organizations who have incorporated mindfulness programs will follow. The downsides of mindfulness programs in organizations that have been shared by critics are also included. A conceptual framework for research on the topic of mindfulness in organizations and some potential research topics will be provided. The author hopes that her SE DSI colleagues will offer their insights and experiences with the topic.

THE DEFINITION OF MINDFULNESS

Jon Kabat-Zinn is a well known author and promoter of mindfulness in general and also of mindfulness in the business world. His definition [7] is "Mindfulness is awareness cultivated by paying attention in a sustained and particular way; on purpose, in the present moment, and non-judgmentally." Many other authors [1], [2], [4], [5] have presented it as meditation but there are many different forms that it can take. For the purposes of this paper, I will focus on the practice of meditation. Many articles and books have been written about this topic.

BENEFITS OF MINDFULNESS MEDITATION

Dienstmann's article [2] lists seventy-six benefits of meditation including links to the research papers that have previously published these. To include that list is way beyond the constraints of this conference paper. However, there are several that lend themselves directly to enhancing performance in business organizations. In this section I will list and describe some of those.

Reduction of Stress and Anxiety in General.

A study from the University of Wisconsin-Madison is cited for indicating that meditation reduces the gray matter density in the areas of the brain that have been linked to stress and anxiety. It is inarguable that stress and anxiety are not helpful in the business world. A quick Google search on the impact of stress on business returned 105,000,000 entries. Hence, it is clear that any reduction of it will improve abilities to get work done and manage well.

Increased Grey Matter Concentration on the Brain.

The research conducted by Harvard neuroscientists indicated that the areas of the brain associated with learning and memory, regulating emotions, sense of self and having perspective

increased among meditators. The size of the increases were correlated with the length of time that the individuals in the study had meditated. It is a given that managers and employees need to have clear knowledge and the ability to think rationally. This can only enhance their performance and decision making.

Improved Psychomotor Vigilance and May Decrease Need for Sleep.

A University of Kentucky study did find that meditation provides at least short-term performance improvement in non-meditators, novice meditators and and experienced meditators, and it found that long term meditators were observed to function better with a decrease in sleep time when compared to matched controls who did not meditate. Further research is needed to see if meditation can really replace a portion of sleep time for the others. Approximately 35% of adults experience six hours of sleep per night [8]. It is well known that this leads to more accidents and injuries as well as reduced cognitive skills and increased errors in judgment. In addition to these issues, lack of sleep also results in a wide range of physiological and psychological problems.

Improved Focus, Attention and Ability to Work under Stress

A University of California study found that during and after meditation training subjects were more skilled at keeping focus especially during repetitive and boring tasks. Cognitive skills were also improved as were information processing tasks that were designed to induce deadline stress. Again, these are crucially important factors required for productive engagement in work and keen management tasks.

Fostered Creativity

A Dutch study demonstrated that the practice of meditation produced positive effects in creativity and divergent thinking. Participants who meditated performed more creatively that non-meditators. Creativity is essential to business practices. According to Dragoon [3] “creativity is perhaps the key attribute most needed and desired to address our 21st century business challenges”. This, of course rings true in the Marketing area but also in the area of leadership. How else do managers solve complex problems?

Produced Positive Health Benefits

Many of the benefits discussed concern the reduction of many physical infirmities. Meditation has been seen to reduce heart disease and stroke, blood pressure, inflammation, and Alzheimer’s. It also prevents asthma rheumatoid arthritis, and inflammatory bowel disease. It also helps treat pre-menstrual syndrome and menopause symptoms. It also helps treat fibromyalgia, and HIV and epilepsy. It can also help increase skin resistance, and well as cessation of smoking issues. Johnson [6] states in 2012 that for General Motors health care costs adds an additional $1200-$2000 to the price of each car produced. Imagine the savings for businesses and consumers that could be secured!

Improved Empathy and Positive Relationships

Benefits range from the increases in the ability to empathize and the feelings of compassion. It also decreases social isolation feelings, worry and loneliness as well as emotional eating. There is cornucopia of literature regarding the link between Emotional Intelligence (EI) and business success.

Other Benefits

There dozens of benefits for children as well as other non-business related advantages. There is a whole separate literature dealing with using mindfulness in classrooms. Everything from the improvement in one's sex life to the reduction of pain and the ability to manage ADHD (attention deficit hyperactive disorder) to the prevention of the tendency to multitask are mentioned. Perhaps this is something that could be used with our college students.

EXAMPLES OF MINDFUL LEADERSHIP AND BUSINESSES THAT ENCOURAGE IT

Literature Review

Many of the sources I examined propose and provide empirical evidence that mindfulness is especially useful for business leaders. Carroll's [3] book is published by Shambhala Publications which is known for providing resources on eastern religions and in their own words they publish "books that present creative and conscious ways of transforming the individual, the society, and the planet".[1] Many of its titles deal with Buddhism and related topics in religion and philosophy. [9]. Carroll, a Buddhist trained HR manager describes the openness that mindfulness brings to management. In this work, he provides various examples of how organizations are already utilizing mindfulness to improve performance in a variety of areas. Some of these include: Raytheon, Procter and Gamble, Nortel Networks, Unilever, Comcast as well as many law firms. A seminar was offered to law enforcement agents in Madison, WI. Others are executives such as Bill Ford, the former chairman of Ford Motor Company; Michael Stephen, the former chairman of Aetna International; Robert Shapiro, the ex-CEO of Monsanto; and Michael Rennie, a managing partner of McKinsey who are reportedly meditators and find the practice beneficial to running corporations.

In the book *Mindful Work: How Meditation is Changing Business from the Inside Out* [4] Gelles presents a nice summary of the roots of mindfulness. He is a practicing Buddhist who has spent much time in meditation in India with respected Buddhist teachers. When he returned and during the time he wrote this book he covered mergers and acquisition news in the *New York Times*. This gave him the access to many large US companies that utilize mindfulness in their firms.

Apple's Mindful Leader

The introduction of the Gelles book provides the story of the presentation that Steve Jobs made

back in 1981 at a tech conference in Boston. The coordinator of the conference panicked when Jobs was nowhere to be found just before his presentation. In a frenzied search of the venue, the coordinator spotted him just sitting with his back to everyone who was backstage. He was meditating. Jobs studied Zen Buddhism and traveled in India where he learned more about meditation. He was perhaps one of the earliest modern managers to find benefits from mindfulness.

Back to the Brain

Gelles continues to describe the scientific findings of the changes to the brain, the benefits (as described above) foster increased compassion and motivation to be socially responsible and ethical as well as engender an enhanced ability to lead.

McMindfulness

It is in the Gelles book that the issue of McMindfulness is raised. Some have alleged that this trend toward mindfulness in business is the conflict some Buddhists may have with their religion being used to improve the bottom line. Some critics are concerned that businesses may water down the practice of meditation. Other critics have charged that McMindfulness can actually be harmful. Some suggest that employers may use it to subdue employees so that they exploit them. However, Gelles states that as he traveled the country observing mindfulness programs he did not observe any of these problems. The worst problem he encountered was that some of the programs were not of the best quality.

Businesses and Organizations That Offer Mindfulness Training

Many firms have been established to provide the service of educating managers and employees the way meditation works. Some visit businesses and provide classes and meditation sessions. Other companies utilize online meditation instructional classes such as eMindful. This is the approach utilized by Aetna.

Mindful Soldiers

It is somewhat controversial that there are courses designed to make our armed forces more mindful. David Forbes, a professor at the City University of New York, conjured up an image of the mindful sniper. However, Gelles points out that there is no record of any mindful snipers being deployed into Iraq or Afghanistan. Instead, mindfulness in the military is used for healing soldiers of PTSD and training them to be able to stay calm in the face of unspeakable stress and pressure so they can make decisions more carefully. Empirical evidence of the positive effects of mindfulness are reported in a 2008 study by Elizabeth Stanley who has brought mindfulness training to the warriors. In sum, Vietnamese monk Thich Nhat Hanh, who has spent his life bringing meditation practice to the west, has said that as long as business leaders practice true mindfulness, it's okay. It is his belief that the practice will change the users of the teachings, opening their hearts, cultivating compassion and inspiring others to reduce suffering in

themselves and others.

Profession Development in Mindfulness

Finally in a description of the Wisdom 2.0 Conference that is held annually now hosts teachers like Jon Kabat-Zinn as well as neuroscientists. Tech luminaries are typical attendees including Twitter founder Evan Williams and LinkedIn CEO Jeff Weiner. Arianna Huffington and Bill Ford as well as Congressman Tim Ryan from Ohio and Congresswoman Tulsa Gabbard from Hawaii also attend. Entrepreneurs, engineers, venture capitalists and executive coaches mingle with meditation instructors and gurus from around the world.

Many tech companies have their own in-house mediation programs. These include Adobe, Apple, Asana, Cisco, eBay, Facebook, Genentech, Intel and many more. The Googleplex which is the home to one of the most influential tech companies has a tyrannosaurus skeleton and a yellow brick road as well as a cafeteria which serves free organic food. Google has employed Chade-Meng Tan to establish and run their "Search Inside Yourself Leadership Institute" (SIYLI) program. This is considered an epicenter of the mindful work movement as well. SIYLI has hosted employees from Plantronics and VMware as well as defense contractors, Farmers Insurance, SAP and more.

The benefits are echoed by a host of other educators and business leaders. For example, Bill George, a professor of management practice at Harvard Business School and former chair and CEO of Medronic [5] writes "When I started meditating, I was able to stay calmer and more focused in my leadership, without losing the 'edge' that I believed had made me successful".

CONCEPTUAL FRAMEWORK AND POSSIBLE RESEARCH PROJECTS

These will be included in the final version of the paper that will be presented at the SE DSI conference.

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EDUCATING COLLEGE BOUND MILLENNIALS: LEVERAGING TECHNOLOGY TO ENGAGE AND EDUCATE STUDENTS

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ABSTRACT

Generation Y, sometimes referred to as "Millennials", "Echo Boomers", or jokingly as "Generation Why?", refers to the cohort of individuals born, roughly, between 1982 and 1994. The millennial generation, like others before it, has been shaped by the events, leaders, developments and trends of its time. However, the emergence and use of technology has had the most defining impact on this generation. For the millennial college bound students' technology has always been a part of their lives. They have advanced technical skills, are adept at finding information, multitasking, and, tend to have shorter attention spans. The rise of instant communication and content creation technologies, and, new media used through video based websites such as YouTube and social networking sites may explain Generation Y's reputation for being peer oriented and for seeking instant gratification. They are voracious consumers of technology and use it for education and entertainment. Educators will need to adapt from providing education to providing edutainment to stimulate and engage this generation of learners. College professors will have to get creative in leveraging technology to engage, motivate and educate this generation of students. In order to be effective educators we must understand our audience and the world they inhabit. This includes trying to understand what factors influence and motivate our students and appreciate that different generations' have their characteristics and habits that mold how they learn and how they respond to their teachers. Each generation has a different approach to learning and, as educators, we need to adapt to provide the appropriate learning environment via relevant and effective teaching strategies.

The connection between Knowledge Management (KM) and organizational success

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Abstract

Knowledge management practices can impact the success of customer relations management within an organization if it used correctly. Implementing this strategic tool effectively can provide an organizational competitive advantage. Employing KM practices may not be the only factor that will contribute to the positive outcomes of the organization's financial performance, but it can help an organization implement the appropriate type of practices that can help the business become successful. Provided with the appropriate information managers can learn to design KM strategic practices that can help them achieve higher innovation, effectiveness, efficiency and profitability for their companies. The main focus of this research study is to reveal the connections between the use of knowledge management practices and the positive outcomes of the organization. The questions that will be addressed within this research study are:

- What is Knowledge Management (KM)?
- Why does using KM practices matter for the company's bottom line?
- How can using KM enhance corporate culture?
- What are the implications and benefits that KM may have?

Keywords: knowledge management (KM), customer relations management (CRM), strategic programs, innovation, effectiveness, efficiency, competitive advantage.

The connection between Knowledge Management (KM) and organizational success

Not many business owners understand how important it is to incorporate customer knowledge into their organizational strategies. This study will be able to help managers understand that there is a relevant connection between the use of knowledge management within their practices and the increase in positive outcomes for their company. There are different knowledge management approaches that can be used to create a connection between a firm and its customers, and they can be successfully incorporated in a manner that will help the company improve its financial performance. There are many firms that are still not able to comprehend the variables that can be used to positively impact the success of KM practices within their organizational strategies, but being provided with helpful information can allow them to be guided into the right direction. An important variable that companies tend to ignore, or lack much understanding of, is the relevance of focusing their orientation towards their customers. If companies would focus more on their customers, rather than just the market or the technology, it can help them bridge the gap between what the customers are really looking for and what the company is offering. Being customer oriented has not been valued in the context that is relevant to a company's success.

Past studies were able to emphasize that there is a need to develop and maintain relationships with customers that are personalized and specific to the company. They were able to provide relevant information regarding which variables within the organization can contribute to building and maintaining successful relationships with the customers. They were able to substantiate how important and critical using customer knowledge is as part of an organizational resource. They also emphasized that internalizing the knowledge management strategies by the entire company is important because it can help the company create an atmosphere that is unique to their competitive advantage. Past studies were able to emphasize that incorporating knowledge

management strategies into a company's performance can be difficult at first, but in the long run it will become a significant mechanism that can greatly impact the company's financial and innovative success.

Past studies were not able to integrate how knowledge management strategies can lead to organizational learning, which is part of helping the company rebuild its organizational functions in a manner that will enhance the overall performance of the company. The previous studies were not able to elaborate on the insights of the various segments involved in creating a successful customer knowledge management strategy. This study will be able to expose the value of incorporating knowledge management into organizational functions of the company. It is pertinent for firms to recognize that although knowledge management is a long-term discipline that needs to be adopted by the whole company, it is simply a means of intercommunication between the company and its customers.

This study will incorporate the variables of the previous studies in a context that reveals how a firm can foster knowledge management strategies into their organizational functions. With these variables, managers and business owners can begin to understand the relevance of combining the different functional departments in a more productive and efficient manner. Knowing how to encourage organizational commitment is another factor that can help the company function in a more productive and efficient manner as well. Company owners can also begin to understand how useful and convenient technical systems can be while implementing knowledge management practices as well. Understanding the kind of information that should be collected is a vital factor of these strategic tools, and it is a variable that can help companies increase their innovative processes. Many of these variables used together can effectively contribute to the success of the company's overall financial performance and help the company achieve a competitive advantage.

The purpose of this research is to identify the relevant variables of knowledge management that can help companies bridge the gap that has held them back from their organizational success. I will summarize the relevance of knowledge management and how it can benefit a company if they implement these variables into their organizational strategies effectively. In this outline, both the benefits and implications of using these practices will be specified so that every aspect of these practices can be represented properly. Knowing how to become customer-oriented can help a firm obtain relevant information that will allow the company to adjust their efforts into a more productive manner. This customer specific information is relevant because it can support the growth of the company's financial performance and it can help the company gain a unique competitive advantage by providing the customers with what they are really looking for.

Literature Review

The studies that I have found provide information regarding the many aspects of the relationships that are critical between the consumers and the organization. Provided that the relationships between the company and its customers are acquired and managed properly, the organization can foster such relationships in a manner that can help the company flourish innovatively and financially. Knowledge management has been proven to be a vital tool for companies, when it comes to attracting new customers and developing long-term relationships with its existing customers. There are various variables that can make the management of customer knowledge an integrated foundation of an achievable competitive advantage. As Andreeva and Kianto (2012) mentioned, KM was not studied previously in depth because it did not seem to be a relevant topic that can help companies become successful.

Andreeva and Kianto (2012) also mentioned that KM practices can be seen as a set of activities performed by managers that help the company understand the value they can provide for

their customers. Attafar et. al's (2013) also mentions that KM can utilize different tools that can help the firm collect customer information, analyze the information collected, and share the analyzed information in a manner that will allow the firm to provide products and services catered to what the consumers really want and need. Using these successful strategies can allow the company to communicate with its customers in a manner that will allow it to obtain explicit and implicit knowledge that is critical to the innovation of their product or service. These successful strategies can also help the firm create future value for their company as well.

Becoming customer-oriented may take a lot more time and effort to incorporate, but using Information Technology and including more effort from the entire organization to establish and maintain those special relationships between the firm and its customers can be very useful. The company has to be committed in combining the many departmental resources within its organization so that they can use the collected information effectively. Collecting information about the customers' is as relevant as collecting information from the customers. This is considered tacit knowledge, and it cannot be replaced with organic information that is mainly collected by formal means. Solely processing the knowledge received from the customers cannot guarantee that the firm will receive valuable information that will help the firm improve their products and services, but knowing what kind of information to collect from and about the customers is a vital factor as well. Ernst et. al's (2011) also mentions that there are various degrees and dimensions of implementation in regards to the KM processes.

Many of the researchers were troubled with the information found from the previous studies because they provided limited data. Their studies resulted in limited data because they were only able to use limited and generalized measures. The sample sizes used could have been more useful if they were of a larger capacity and contributed by internal and external sources relative to

the organization. The studies were not able to demonstrate the long-term evolution of the KM strategies within an organization. This knowledge of the processes that have occurred during the long term evolution could have been a resourceful tool in helping other managers understand what processes could be helpful, changed, or completely avoided while executing KM applications. This long-term historical process can also provide different views of the stages of implementation, beginning from the early stages up to the late stages of implementation. Although there has been sufficient data to demonstrate the usefulness of integrating knowledge management into the organizational culture, many managers still do not understand which variables can help their company successfully integrate KM initiatives into their strategic processes. The models have not been clear in regards to this critical information. This study will provide a framework that will allow managers to conceptualize which components are vital to the integration of knowledge management strategies within an organization. Customer knowledge is a vital resource that organizations should be encouraged to use because it will help them to achieve greater innovations and successfully improve their financial performance.

Conceptual Model and Hypothesis

Knowledge Management "enables a firm to position its tacit knowledge for responding quickly to customers, creating new markets, developing new products, and dominating emerging technologies" (Shannak, et al., 2012). According to Shannak, it is a practice that provides a dynamic form of communication between the company and its customers. KM allows the company to collect relevant information from the customers in a manner that will allow the organization to adapt their product or services according to what is in demand. According to Anand and Singh, "KM is the explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation" (2011). KM becomes an

organizational resource once the relevant knowledge from the customers is "unlocked and leveraged" (Anand & Singh, 2011). According to Attafar, et al. (2013), knowledge is acquired from the customers, for the customers and about the customers. When you are able to recognize the needs of the customers the firm can augment the procedural effectiveness of the business in a manner that will attract the customers.

H1: Greater levels of Knowledge Management leads to better Customer Relations Management.

H2: Greater levels of Knowledge Management leads to better Technical Systems Management.

H3: Greater levels of Knowledge Management leads to better Organizational Systems Management.

Customer Relations Management **"**is a process to identify, select, acquire, develop and retain profitable customers" (Attafar, et al., 2013). Customer Relations Management is a tool that allows a company to acquire relevant data from the customers via various resources such as store surveys or surveys done via the internet. Using company exhibits is another resource tool that can allow the customers to provide useful feedback after direct contact with the product or service being offered. Companies have many other resourceful platforms that can allow them to receive useful information, such as the positive and negative insights from the customers, that can help the company adjust their offerings according to what the customers prefer. Customer Relations Management and Knowledge Management are different strategic tools that can work together to deliver continuous product improvements, which will benefit and attract more customers. According to Garrido-Moreno and Melendez (2011) Customer Relations Management "is a business strategy that aims to establish and develop value-creating relationships with customers based on knowledge". It involves the identification of customer types according to their likes

and dislikes of the products being offered, and customer specific processes that allow the firm to interact with the different categories of customers.

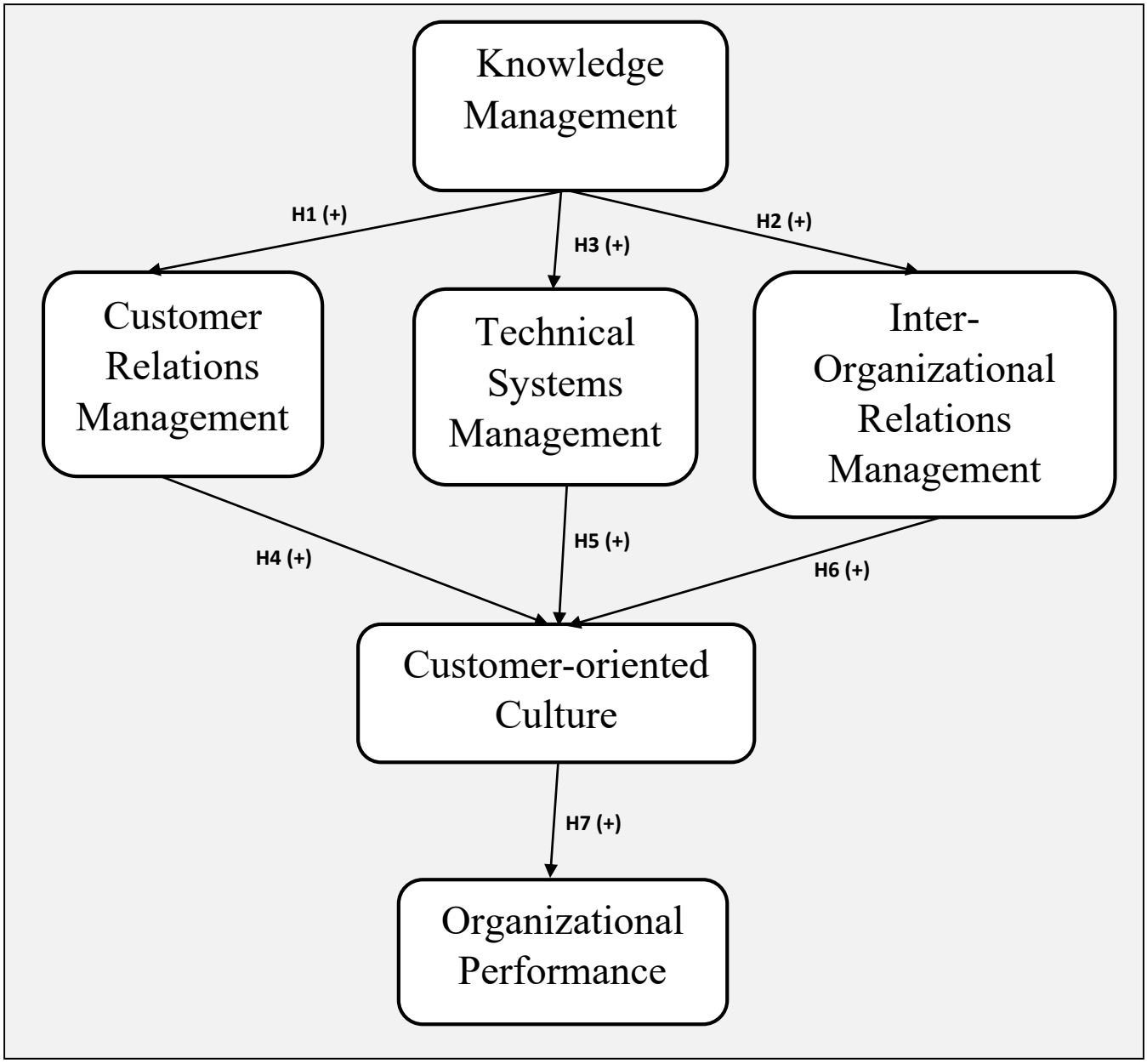
H4: Higher levels of Customer Relations Management positively influences the Customer-Oriented Culture.

Technical Systems Management is an "infrastructure that is consisted by the hardware, software, middle-ware, and protocol that allow for the electronic exchange of knowledge" (Shannak, et al., 2012). It is a system that allows the firm to electronically work with the customers in a manner that will help them learn more about them. It also allows the company to facilitate the augmentation and support of the processes used to integrate the acquired knowledge into the organizational routines.

H5: Higher levels of Technical Systems Management positively influences the Customer-Oriented Culture.

Inter-Organizational Relations Management will allow the company to "redesign [the] organization and its processes to orient them to the customers" (Garrido-Morreno and Melendez, 2011). Restructuring the inter-organizational processes can help the company provide the better suited customer-oriented procedures, which will allow the customers to feel optimally satisfied when they receive what they may believe to be personalized benefits from the product's innovative features. Being able to adjust the internal processes used to create the offering will help the customers feel as if the company is providing a product or service that is especially catered to what they are looking for. Satisfying customer wants and needs leads to generating relationships with the customers that can become long-term, beneficial and may help them become loyal to the company.

Figure 1: Conceptual Framework



H6: The better the Inter-Organizational Relations Management the better the Customer-Oriented Culture.

According to Shannak, et al. (2012) "culture refers to the shared beliefs, norms, ethics, and practices in an organization. When the whole organization is able to share the same beliefs and

follow the same practices, the organizational results become optimized and easier to achieve. When a company can work together to integrate the collected knowledge relating to the customers, they can incorporate that knowledge into a product that will support what the customers value the most. When the customers feel that they can receive value from what the company can offer them, they tend to remain dependent on what that company can provide for them.

H7: Greater levels of Customer-Oriented Culture leads to better Organizational Performance.

Discussion

Knowledge management practices can help an organization achieve innovative success if it is properly utilized and integrated within the structures of the organization. Proper knowledge management can help an organization interact and communicate with its customers in a manner that will help them understand what is in demand from the consumers. When a company can understand the relevant factors that can help them alter their offerings according to what the customers are looking for, they can increase their value to their customers. This increased value will encourage the customers to increase their sales and thus increase the company's profits. The integration of these practices can become a vital organizational resource that can help the company retain its existing customers and attract many new ones. The functions of these approaches are to help the organization develop new relationships and strengthen already existing ones by delivering the value that meets the wants and needs of the consumers.

The information that is retained through these KM strategies can positively influence the organizational variables that are used to develop and manage the company's offerings. The organizational variables that are taken into account when restructuring the fundamental

orientations of the organization into the newly developed customer-centric orientation include: the management of customer relations, the management of the technical systems, and the management of the inter-organizational relations. Other factors that are taken into account also include the inter-departmental functions of these organizations and the strategies that are used within them. Once the applicable customer-specific adaptations are integrated within the entire organization, the company can then achieve a unique competitive advantage that will increase its overall organizational performance. This competitive advantage will provide value that will be unique to the organization and this kind of value will be difficult to replicate by other organizations. The company's policies and approaches can continue to progress with the continuous and profound incorporation of the techniques established through this newly developed reconstruction. Once this integration of customer-focused knowledge takes place, the culture of the organization can be transformed into a customer-oriented culture.

In order for these practices to become effective, the organization needs to know what type of customer-specific information should be collected. Once the organization is able to collect the customer-focused tacit and explicit knowledge, they can integrate this data into the organizational structure by using the appropriate social and technological systems available. The information is then collectively evaluated in order to determine how it can be converted into valuable data for the organization. This data can be systematically categorized according to the types of customers, the types of consumer preferences, or the levels of valuable contributions the consumers can provide to the organization. This data is then shared throughout the organization in a manner that will allow the offering to be catered to what the customers perceive to be of greater value.

This customer-specific data can be collected by utilizing various channels that foster open lines of communication with the consumers. The systematic integration of the multiple communication channels can be used to effectively and efficiently manage the interactive dialogs with the customers. These channels of communication can facilitate strategic conversations between the consumers and the organization, which can be done via informal emails, chatrooms, and/or surveys. Through these methods of communication, the organization can identify the types of customers that can provide valuable information, and the extent of customer integration that should be allowed within the organization. They can use these forms of communication to express the various successes and failures of the offering that they have personally experienced. The information attributed from the customers is specific to the attitudes and skills accredited to the experience of that customer. The employees also play a vital role in communicating with the customers as well. They gather, store, and transfer the relevant data received from the customers as soon as the interactions take place. The employees are able to directly interact with the customers and can manage those relationships more effectively. Providing incentives is another strategic method of communication that can be used to obtain relevant customer-focused data as well. Additional forms of communication can be facilitated via the internet, company stores, company exhibits, and interaction centers.

The set of management activities utilized within the KM approaches focus on the combination of the technical and human aspects that allow the organization to deliver better products and services to its customers. The technical aspect of the processes includes the management of the technological infrastructures that allow the organization to exchange knowledge electronically. The human aspect of the processes includes the management of the human-oriented infrastructure. When both aspects of the management activities are combined

successfully, they can yield meaningful integrated data for the organization. Proper management of this data can be done through the proper utilization of the personnel and information centers that can adequately document and file the meaningful integrated data for the organization. When the knowledge is acquired appropriately, it can be utilized to realize the customer-oriented aspired value.

When a company is able to reconstruct their offerings according to the customer's perceived values, they can provide better offerings that can attract a larger customer base. Being able to adapt the quality of the offering allows the company to improve their offering which will also provide a positive increase in its overall financial performance.

Managerial Implications

Knowledge is a critical organizational resource that positively influences the success of an organization. In order for an organization to become successful they have to be able to manage this acquired knowledge properly and learn how to appropriately integrate this knowledge into the entire organizational framework. Although this is a learned discipline that can take time to develop, it is a discipline that will allow the organization to innovatively adapt, grow, and remain competitive. Once the organization learns how to manage their renewable and reusable resource more efficiently and effectively, they will be able to enhance their productive performance. Through this process they will also be able to achieve greater financial performance and a competitive advantage as well.

Provided with the correct information, managers can successfully incorporate the firm's interdepartmental resources in a more productive manner. They can also learn to design the KM

strategic programs that can help the firm achieve greater innovations, better effectiveness, higher efficiency and increase profitability for their company as well.

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Effective use of Software for Statistics Instruction

Session Chair: Bob Andrews, Virginia Commonwealth University

Presenters:
Julian Parris, JMP
Patrick Barbera, Pearson

Abstract: Presenters will demonstrate the use of their software to help students learn and engage with core concepts in statistics and data analysis ranging from introductory statistics to analytics procedures. MyStatLab software helps to manage and individualize the learning and evaluation process through several capabilities such as auto-graded Excel based exercises. JMP examples will include simulations to demonstrate foundational topics such as the sampling distribution of the mean and outlier influence to how interactivity of a visualization can illuminate the output of unsupervised machine learning algorithms for clustering, and how dynamic and responsive graphics can be used to teach core design principles in effective data visualization.

Enhancing the Value of Analysis through Effective Skills and Communication,

Session Chair: Bob Andrews, Virginia Commonwealth University

Presenters and Panelists:
Mary Malliaris, Loyola University Chicago
Mary Dunaway, University of Virginia
Bob Andrews, Virginia Commonwealth University
Wilma Andrews, Virginia Commonwealth University

Abstract: A chain is no stronger than its weakest link. Knowledge of current analysis methods and developing the ability to communicate effectively with others who have a different knowledge base can be weak links in the preparation for statistics and analytics analysis. Panel members relate their experiences to work on improving student knowledge of statistics and analytics methods as well as their communication skills. Effective communication includes learning to ask the proper questions to truly understand the problem being analyzed and finishes with communicating what will be of value to the audience when analysis results are presented.

ETHICAL PERSPECTIVES ON THE EXTENT OF SOCIAL RESPONSIBILITY IN SUPPLY CHAIN MANAGEMENT

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ABSTRACT

Recent supply chain management research has acknowledged the importance of balancing social and environmental responsibility with economic performance [5]. The decisions made by supply chain managers can have a far-reaching impact on the economic, environmental, and social performance of the entire supply chain, even though many activities that occur in the supply chain are not under the direct control of those managers [1]. Some firms draw a line of moral disengagement, beyond which they distance themselves from the social and environmental impact of the activities of the supply chain [2], while others rely on suppliers to take a leading role in enforcing responsible practices [4].

We draw upon ten ethical perspectives to provide insight into how far along the supply chain the line of moral responsibility should be drawn, and whether it should be drawn at all. We argue that the ten perspectives converge to three primary approaches to managing social responsibility in supply chains: a. internal focus; b. stakeholder focus; and c. extended stakeholder focus. Several issues are discussed with regard to the application of these approaches, including the focal firm's power to control the actions of supply chain partners and the interplay among legal, moral, and financial responsibilities. Triple bottom line arguments may be inadequate to fully address the implications of the decision to take actions toward social responsibility or sustainability, as they often prioritize the economic dimension [3]. This research discusses the ethical and moral implications of those decisions, and in doing so, provides insight to managers and researchers alike.

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Exit, Voice, and Loyalty: Some Academic Factors as Institutional Antecedents of Student Success in U.S. Universities

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Julian Gnana Das, *Sri Krishna Arts and Science College, India*
Heather Chaney, *Clayton State University, USA*

Student success has long been considered as the "holy grail" of enrollment management in higher education. Student success generally refers to students persisting to completion of their educational goals. The most frequently cited variables to measure student success are: student retention (freshman-to-sophomore retention rate or first year annual return rate) and time to graduation (four-year cohort graduation rate, and six-year cohort graduation rate). Student retention rate in the context of U.S. higher education is defined as the percentage of first-time full-time students enrolled at the university the following Fall semester. The four-year student graduation rate is defined as the percentage of an entering class that graduates within four years with a baccalaureate degree. The six-year student graduation rate is defined as the percentage of an entering class that graduates within six years with a baccalaureate degree.

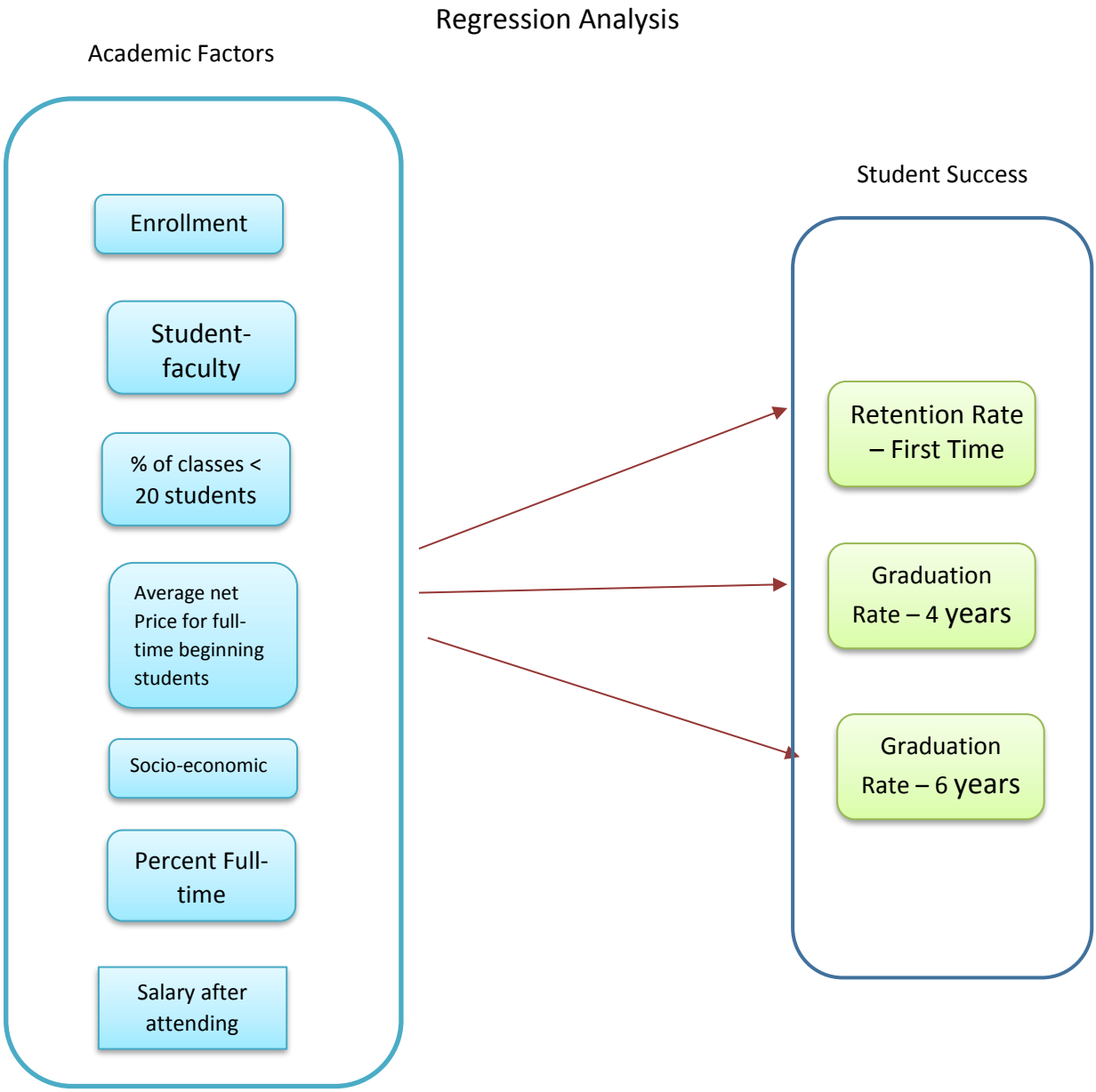
Extant research is replete with predictor variables that have been shown to influence student retention or graduation. For example, student retention is influenced by financial aid, parents' education, the number of semester hours enrolled in and dropped during the first fall semester, developmental education programs, internet-based courses, and participation in the Student Support Services program (Fike and Fike, 2008). Other factors identified are: High School GPA, Gender, SAT/ACT, Race/Ethnicity, High School Rank, Household Income, First-Semester (-Year) College GPA, First Generation, College Gateway "Killer" Courses, Loan Aid, Gift/Grant Aid, Transfer/Commuter, Work Study Aid, Student Need, Big Five Personality Traits, Locus of Control, Self-Esteem/Self-Efficacy, and Student Readiness Inventory (Hanover Research, 2011). Lopez-Wagner, Carollo, and Shindledecker (2010) found that the predictors of retention for at-risk students are: Ethnicity, high school GPA, University Studies 100 enrollment, first term GPA, percent of courses completed during the first year, and number of general education courses enrolled during the first year.

However, there are three gaps in the existing research in this area. First, retention and graduation rates have mostly been studies separately, with their own set of antecedents, thus making it difficult to comate between the two. Second, the published research in this field has mostly been conducted at the individual student level, and not at the institutional level. Third, we consider academic factors as antecedents to student success in our model, which differentiates it from other research that have focused on demographics, socio-economic factors, and student services and other support factors.

The purpose of this research is to understand the effects of a common set of academic factors on student retention and graduation rates at the institutional level in U.S. higher education. More specifically, we explore, using secondary data, the individual and interaction effects of seven academic factors: Enrollment, Student-Faculty Ratio, Percent classes with fewer than 20 students, Average Net Price, Socio-Economic Diversity, Salary after Attending, and Percent of Full-Time Students, on three outcome variables: 4-year graduation performance, 6-year graduation performance, and student retention rate.

The theoretical background of this research is based on the Exit, Voice and Loyalty theory (Hirschman, 1970). Three separate regression models were tested, one each for each of the three dependent variables. The results provide interesting insights for enrollment management.

Model: Academic Factors and Student Success



Experiences with and Recommendations for using R for Statistics/Analytics Instruction,

Session Chair: Bob Andrews, Virginia Commonwealth University

Presenters and Panelists:

Jerry "Buddy" Bilbrey, Lander University
Tobin Turner, Presbyterian University
David Stephan, Two Bridges Instructional Technology

Abstract: R was the top software in the 2016 KDnuggets Software Poll that asked practicing professionals what software they used for Analytics, Data Mining, Data Science, and Machine Learning projects in the past 12 months. The presenters in this session will report on their experiences with teaching statistics and analytics procedures using R software. This will include the R integration features in JMP and discuss reasons for using R from inside JMP.

EXPLORING SECURITY CONSIDERATIONS IN SERVICE ENVIRONMENTS

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ABSTRACT

The open literature has shed little light on how to conceptualize security provisions in services. This research uses previously developed service and production positioning matrices as an input for the development of a service security typology. Three service processes are critically examined in relation to their security risk and difficulty. We believe the typology offers service industry practitioners a first step in developing appropriate service security measures.

INTRODUCTION

Security has become an increasing concern primarily due to deliberate attacks. The attack on the World Trade Center on September 11, 2001, focused immediate attention on eliminating massive physical harm as evidenced by the concentrated effort to enhance security in airline transportation systems. Other recent attacks in service settings include the Boston Marathon bombing in 2013 and the Orlando nightclub attack in 2016.

In addition to concerns about physical security, there has also been a dramatic rise in the need to develop cyber security measures. Retail stores, banks and other systems have been successfully hacked. These attacks can have broad reaching effects. For instance, the cyber-attack on the retail store Target is believed to have impacted as much as one-third of the population of the United States (Wallace, 2014). These security concerns as well as others, create a need for the development of a service industry typology to help assess their security risks. Vulnerabilities need to be assessed and characterized such that appropriate security measures can be identified and implemented. Ideally security measures within a service system need to reduce threats and risks in the least intrusive manner. Customers want to feel secure in the system without feeling overwhelmed by security measures.

The primary purpose of this research is to categorize various service systems in order to develop a framework that service firms can use to capture and assess their security risks. Guidelines that might be helpful in the design and positioning of security threat interventions are presented. To the best of our knowledge, the open literature has shed little light on the development of a holistic topology for service security measures. Our work addresses this gap by developing a conceptual framework to assist in prioritizing service system threats based on the system's characteristics and developing appropriate mitigation strategies to diminish security risks.

LITERATURE REVIEW

Conceptualizing the Service System

Several research studies have been devoted to categorizing services to support managerial decision-making for process improvement. To our knowledge, Shostack [23] was the first to introduce the term blueprinting in the context of services which defines the process of exploring all issues inherent in creating and managing a service. Blueprinting considers several issues including: (1) identifying processes, (2) isolating fail points, (3) establishing time frame, and (4) analyzing profitability [1]. Early attempts at service blueprinting opted to view service systems from the perspective of manufacturing operating systems [2]. Later studies attempted to fold in the behavioral dimensions that exemplify services (i.e., [19, 15]). Below, we describe specific research works that provide a basis for our conceptual framework for service security systems. We posit that the basic tenets of service blueprinting can be applied to explore issues inherent in managing service security threats.

Customer Contact in Services

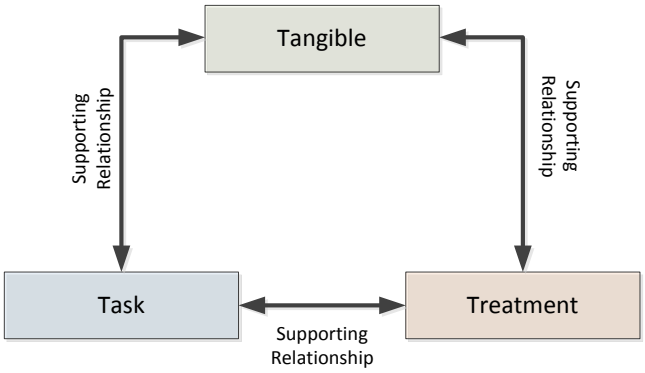
The concept of customer contact in services has been explored in many studies [3, 5, 22, 24, 25, 28]. Chase [3, p. 138] defined customer contact in service creation as "the physical presence of the customer in the system" during the provision of the service. Customer contact is further differentiated as low, mixed, or high to acknowledge the multidimensional relationship of human involvement in the service system. In a low contact service, the technical core can be separated from the service provision so that the customer is not aware of it [3, p. 138]. The notion of decoupling the technical core as a primary descriptor for customer contact acknowledges the multidimensional relationship of human involvement in the service system. Chase [3] characterizes low contact services as "quasi-manufacturing" given the limited face-to-face contact. Examples include distribution systems and government administration [3].

Mixed services have greater customer contact and include services such as bank branches and funeral homes. Pure services have the highest degree of customer contact and provide little separation of the technical core or the so-called engine of the service provision. High contact services are especially complex because of the uncertainties that arise due to customer involvement in the provision of the service and thus are less amenable to the extension of the manufacturing rationale which prizes homogeneity and consistency [28]. Examples of high contact services include a hair salon or custom jewelry making.

The 3-Ts in (Tangibles, Task, and Treatment) Service Design

To further our examination of service security systems, we utilize the 3-T framework developed by Chase and Stewart [6] that comprehensively examined the service system by decoupling the physical, process, and interpersonal parts of a service system. The 3-T framework identifies the (1) tangibles, (2) task, and (3) treatment aspects of the system. Specifically, *tangibles* are defined as the facilities or physical structure of the service; the *task* represents the processes or activities that occur as part of the transformation process; and the *treatment* represents the relationships between the employees and customers in the service process [6].

FIGURE 1
3-T FRAMEWORK
ADAPTED FROM CHASE AND STEWART [6]



Categorizing Service Operations

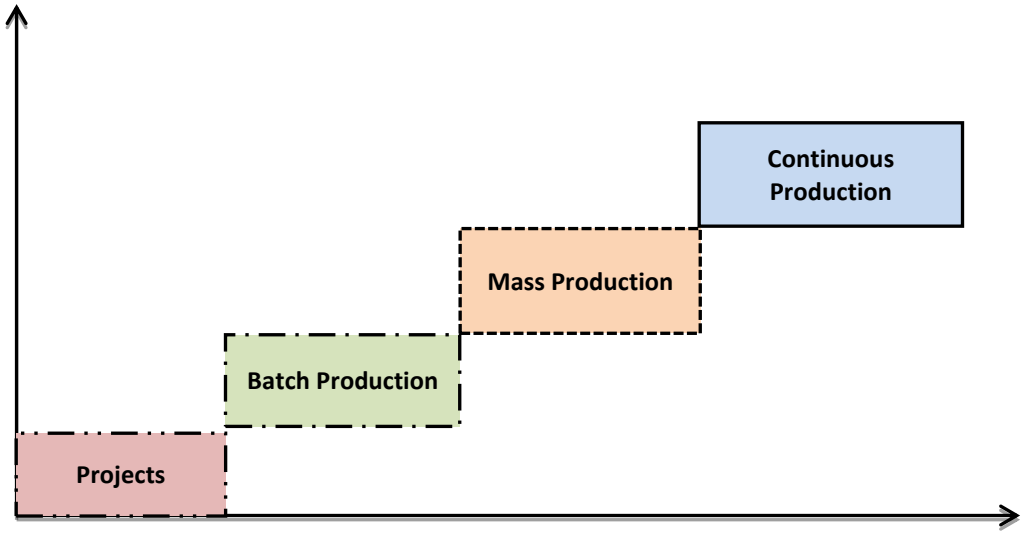
In the seminal work of Hayes and Wheelwright [10, 11], a product-process matrix is developed which categorizes the manufacturing function by product standardization and production volumes. Optimal combinations are identified as the combinations on the diagonal (Figure 1). Many authors beginning in the 1980s have built on this model to develop frameworks designed specifically for use in services.

Tinnilä, M. & Vepsäläinen [25] state that quantifying the volume and variety (i.e. standardization) of services is less exact than in manufacturing operations. Thus, a straightforward adaptation of the Hayes and Wheelwright [10, 11] product-process matrix is challenging.

Nevertheless, authors have attempted to adapt the use of standardization and volume in service contexts. There is considerable acceptance by several authors to relate product variety to customization of the service delivery [17, 16, 14, 13]. A number of authors chose to combine the notion of customization with other ideas. For instance, Schmenner [20] measured the degree of interaction and customization on two extremes. Haynes [12] developed a measure called the degree to which the operation is mechanistic or organic by combining the degree of customization and the interaction between the customer and service. Later, Schmenner [21] examined the degree of variation which included customization for and interaction with the customer.

Two additional studies defined standardization using a measure other than customization. Wemmerlov [27] used the degree of routinization which was defined as either fluid or rigid. Collier and Meyer [7] developed a measure defined as the customer's service encounter activity sequence in their model. The model identified two extremes, unique non repeatable sequences and highly repeatable sequences.

FIGURE 2
PRODUCT PROCESS MATRIX
(ADAPTED FROM HAYES AND WHEELWRIGHT [10]



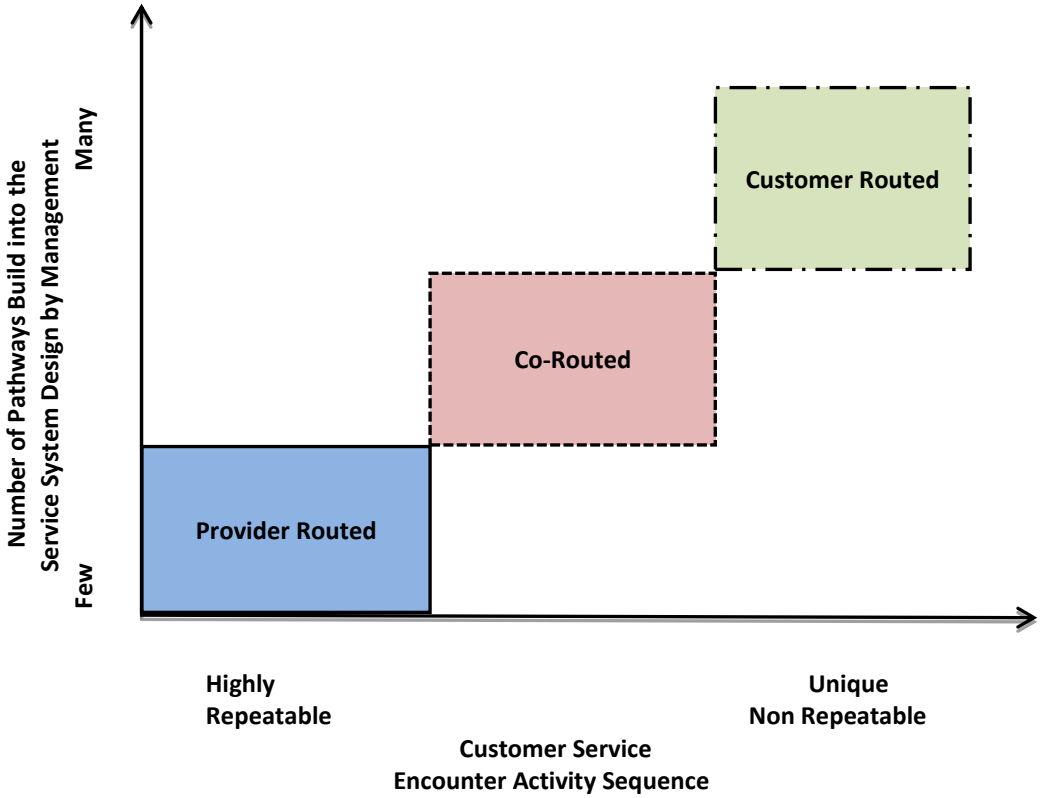
The development of analogous measures for production volumes in the Hayes and Wheelwright [10, 11] model has proved more problematic in service settings. Some authors have tried to find measures that are similar. For instance, Schmenner [21] used high or low relative throughput time while Haywood-Farmer (1988) developed a measure called degree of labor intensity. Other authors have used the extent of customer contact [17, 13, 27]; value added in the front office or back office [16]; product/process focus [14]; degree of labor intensity [20]; the degree of operational complexity [12]; and the number of pathways built into the service design by management ranging from few to many [7].

CONCEPTUAL DESIGN ISSUES FOR A SERVICE SECURITY SYSTEM

Types of Services

We use Collier and Meyer's [7] service positioning matrix in developing a framework to characterize security considerations in service industries. Variables used in the model include the customers' service encounter activity sequence and the number of pathways built into the service system designed by management [7] (Figure 3). In developing the horizontal axis, they considered both "the degree of customer discretion, freedom and decision making power in selecting their service encounter activity sequence(s)" and "the degree of repeatability of the service encounter activity sequence(s)" [7, p. 1232]. This variable is related to the volume variable in the Hayes and Wheelwright's [10] model [7]. This variable measures how much freedom is available and how much is actually used by the customer.

FIGURE 3
SERVICESS PROCESS MATRIX
(ADAPTED FROM COLLIER AND MEYER, 1998)



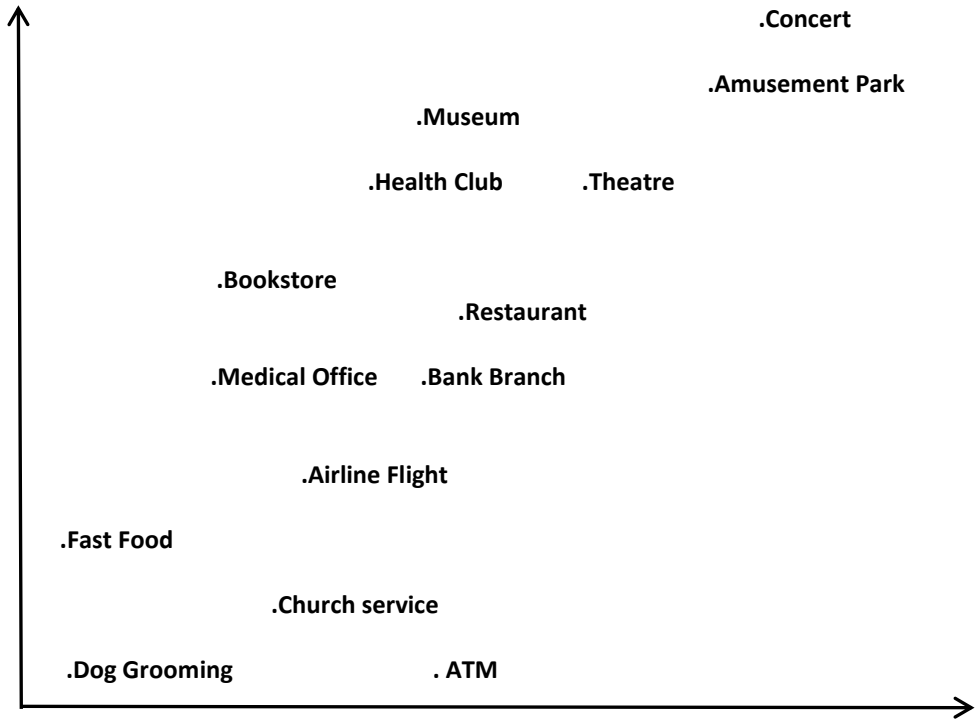
The vertical axis in the model was the number of pathways built into the service system design by management. This represents the control that management designs into the service system to articulate customer freedom.

Collier and Meyer [7] then identified three types of services along the diagonal of the matrix: provider routed, co-routed and customer routed. In a provider routed service, the customer has little control over how the service unfolds (Figure 4). That is, customers have little control to affect the tangibles, task, and treatment options within the service system. All customers entering the service system experience essentially the same service offering. For example, an ATM service experience is very similar for customers. There are a limited number of choices and virtually no contact with actual service personnel. The service process of taking an airline flight is also highly provider controlled but there is greater interaction between the customer and server. Fast food restaurant service is another example of a process that is limited in pathways and has a highly repeatable activity sequence. Customers arrive and wait in a queue and make choices from a standardized menu (that encourages them to make choices from standardized "meal deals").

A co-routed system is one in which customers have moderate levels of both service encounter activity sequences and pathways. Examples of these types of services might include a medical office or a full service restaurant.

Customer routed services experience the most flexibility in pathways and service activity sequences and thus present unique challenges. The customer is part of the service provision and often directs the service encounter. For example, an amusement park patron has great liberty to determine the order and the extent to which they engage with rides, vendors, games, etc. Similarly, a health club patron may engage in a variety of different activities depending on customer needs and availability. Customers in a theatre are typically expected to sit in an assigned sit and enjoy the production whereas nightclub patrons are given the liberty to choose from a number of activities (i.e., dancing, Karaoke, etc.).

FIGURE 4
SERVICE EXAMPLES USING COLLIER AND MEYER [7]

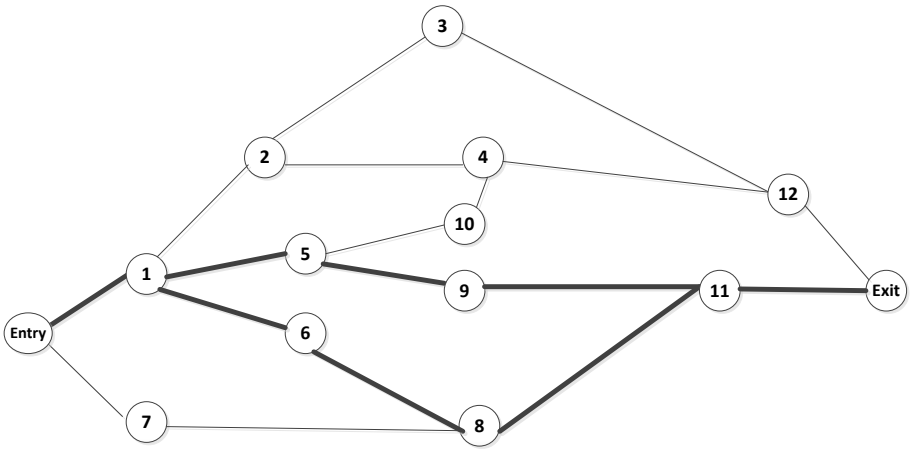


Collier and Meyer's [7] service positioning matrix is well-suited for examining security considerations in services. As one moves up the diagonal, the role of the customer is more pronounced given that the number of pathways that customers can take through the service system is increased. In contrast, services at the beginning of the diagonal (lower left) offer little freedom to the customer in terms of the service encounter sequence and thus are more provider focused.

ASSESSING SECURITY RISKS USING THE SERVICE SECURITY TYPOLOGY

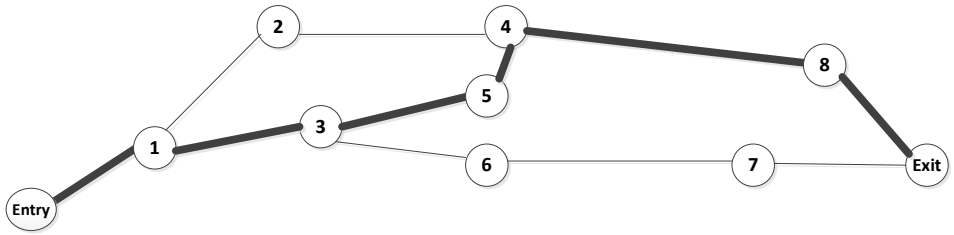
There are two core considerations fundamental to our use of Collier and Meyer's framework in the context of service security – the actual number of pathways that exist in the system and the customer flows on each pathway. A service system with more pathways is not necessarily more difficult to secure than a service system with fewer pathways. The number of pathways that are actually selected by customers may be few. In Figure 5, there are a number of pathways that can be selected; however, a closer look reveals that two paths are selected at a much higher rate than the others.

FIGURE 5
CUSTOMER PATHWAY SELECTION



Additionally, a system with a minimal number of pathways could have varying customer flows that increase the complexity of security considerations. As Figure 6 shows, there are few pathways but the system has heavy customer flows.

FIGURE 6
PATHWAYS AND FLOWS



CONCEPTUAL DESIGNS ISSUES FOR SERVICE SECURITY SYSTEMS

Harvey [9, p. 587] points out "the challenge of the service provider is to orchestrate the encounter so that all technical imperatives are met (i.e. high technical process quality)" while managing customers' perception of process quality and customer expectations of the service. Harvey [9, p. 587] states "service quality is so intangible that objective measurement is impossible; the challenge lies mostly in managing appearances and perceptions."

To assist with the conceptual visualization of service security issues, we return to the approach of blueprinting. In service blueprinting the term "line of visibility" is used to separate what the customer experiences (onstage activity) from what takes place in the back office (backstage activity) [23, 9]. Service providers want customers to see enough security to feel safe but not so much that it interferes with their experience by making them uncomfortable or fearful in the service environment. For example, in a children's museum the use of matching ID bands for parents and children that are checked upon exit from the facility might be a welcome security measure. However, armed security guards may cause museum patrons to feel that the environment is not safe as a result of the presence of such an aggressive security measure.

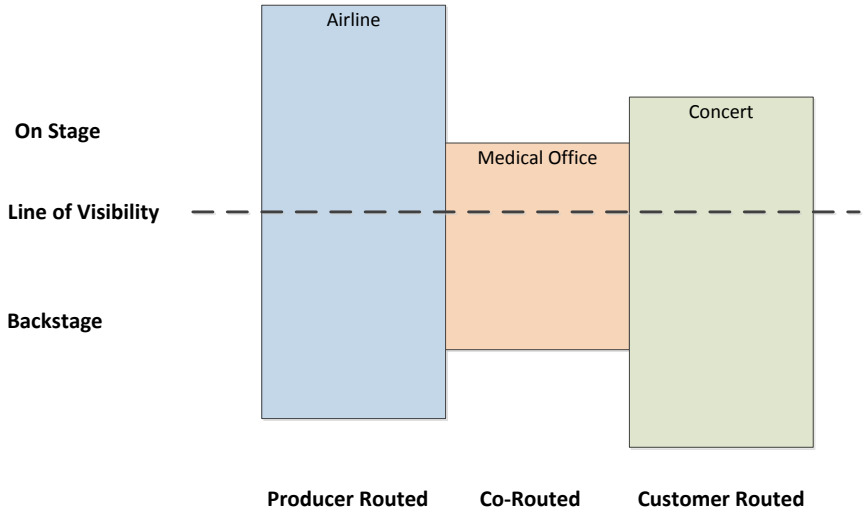
We believe the determination of the position of the line of visibility depends on a variety of factors. Service type (customer routed, co-routed, provider routed), is one factor. However within each service type are a number of different services that do not necessarily share the same characteristics (i.e., ATM and airline flight). Similarly, an individual firm may make different choices relating to the task, tangibles, and treatment. For example, a concert may opt to have either specified or non-specified seating.

Figure 7 presents a specific service example in each of the three service process types. An airline flight is an example of a producer routed service. Airline passengers all engage in the same process of boarding, flying and exiting (task) within the same environment (tangible) and have similar interactions with airline personnel (treatment). Customers are rigidly processed through this system with little flexibility as observed by onstage practices such as specific entry and exit, ticketing, and baggage stipulations. Nevertheless, the sheer volume of customers all in one place can be an attractive security target, thus placing greater demands on backstage security considerations.

Co-routed services may provide greater variability in customer pathways thus demanding different security considerations than provider routed services. Customers have a greater impact over the tangibles, tasks, and treatment involved in the co-routed service system. A medical office requires a customer to have an appointment and to check-in prior to receiving medical care. Backstage security may involve staff and video monitoring or information technology controls (i.e., pharmaceutical control).

For customer routed services, the on and off stage security considerations may be complicated by the fact that customers have greater control over how they negotiate the system. For example, in a concert setting entry and exit are controlled and police security is visible. Patrons may also be required to clear metal detectors and bag checks. Backstage security measures may include staff and video monitoring and first responder presence.

FIGURE 7
THE IMPACT OF THE LINE OF VISIBILITY ON SERVICE SECURITY CONSIDERATIONS



SUMMARY AND CONCLUSIONS

This research is a starting point for service providers to better understand their security options in relation to their service processes. Provider routed, co-routed and customer routed services face vastly different security challenges. This process positioning was used as a basis for discussion of both onstage and backstage security issues. Extensions to this research should explore a more fine grained analysis of the explicit security considerations in provider routed, co-routed and customer routed processes while simultaneously accounting for differences in the task, tangibles, and treatment of a given service.

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EXPLORING WEB AND MOBILE DEVELOPMENT KNOWLEDGE, SKILLS AND ABILITIES: A CONSENSUS-BASED PILE SORT METHODOLOGY

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ABSTRACT

The increasing use of mobile devices, availability of wireless Internet, and growing consumerism on the web have created a need for information technology workers with the knowledge, skills and abilities to meet the demand for responsive websites and mobile applications. The proposed research will analyze a corpus of job advertisements—using both automated and non-automated methods—to provide a contemporary review of the most in-demand web and mobile development job skills. The results of this study can be used by educators in designing curriculum that address the current needs of industry in terms of information technology workers.

INTRODUCTION

With the explosive growth in mobile device adoption and increasing availability of wireless Internet, accessing the web through mobile devices is becoming common. Indeed, Americans today are using mobile devices more than personal computers to access the Internet [13]. Nearly two-thirds of Americans now own smartphones [16] and 7% of Americans exclusively depend on the smartphone for Internet access. The trend of mobile internet access is driving a need for websites with a responsive design — websites that can adapt to a variety of devices and mobile technologies. It is therefore not surprising that many companies are seeking to employ more workers with the knowledge, skills and abilities (KSAs) in areas such as website design and development, and mobile technologies.

Although web and mobile technologies (WMT) are increasingly important, with the majority of software development jobs expected to be within the web context [6], academic research and curriculum development may lag behind the needs of industry. A recent review of conference papers presented at two education-focused ACM Special Interest Groups meetings (SIGCSE and ITiCSE) found that only 1.5 percent of papers presented in the prior decade pertained to teaching web development, with only 17 papers since 2005 [6]. In contrast, 65 papers had a focus on game-related topics, during the same timeframe. Connolly [6] came to the conclusion that it appears that the significant rise in web and mobile technologies within the workplace has not necessarily correlated with an increase in attention to this field by researchers and educators. Connolly [6] also had the foresight to predict that the web development environment was at the start of a new cycle of change, making the case that educators will be hard-pressed to update their curricula to include the breadth of additional, essential technologies and skills that will be in demand going forward.

The growing importance of WMT within the information technology (IT) workplace raises a number of issues in terms of educating students who can fulfill such roles: 1. What are the expected core KSAs of employees within the WMT field?; 2. What is the state of education in meeting the demands for WMT-related KSAs? These issues have motivated the authors to investigate WMT-related KSAs, based on a content analysis of job advertisements for positions within the WMT field. Specifically, to analyze the corpus of jobs advertisements, we make use of both automated and non-automated methods, with the non-automated method being the application of a consensus-based pile sort methodology.

The research extends previous studies on WMT-related KSAs. It also narrows the focus on IT skills gap research to the web and mobile areas. First, we present a brief overview of these research streams, as well as job advertisement content analysis. Next, the methodology section discusses the consensus-based pile sort method as an extension of traditional pile-sort. A description of the initial data collection is then presented, followed by a description of future analysis. Finally, the paper closes with a brief discussion of anticipated results and contribution.

LITERATURE REVIEW

Evolution of IT KSAs

There is a long history of researchers investigating IT-related workplace skills valued by employers and their alignment to IT program curricula. Trauth, Farwell, and Lee [21] recommended that industry and academia work together to address the "expectation gap" identified between industry needs and academic preparation. IT researchers have revisited this issue many times since finding that, as one might expect, the specifics of desirable technical IT skills have changed over the years. For example, COBOL was identified as one of the ten most valuable skills to learn in the 1990s [14], but is hardly mentioned today. In contrast, a more recent study found growing importance in skills relating to web applications, security, data management, mobile commerce and wireless technologies [11]. New technologies, such as HTML5, CSS3, jQuery, responsive design, CSS frameworks, Android and iOS development that were nowhere in our vocabulary just a few years ago [18] are now among the fastest growing job trends. Five of the top ten keyword trends are directly related to mobile web development with HTML5 reported as "the fastest growing keyword found in all online job postings" by *Indeed.com* in mid-2014. Moreover, Smith and Ali [17] determined newer programming languages, Python and Ruby, were identified as trending upwards, as were newer web development technologies of HTML5, CSS3, JQuery and PHP [18]. Smith and Ali [18] pointed out that the skills needed for web development are vastly different from those needed for standard computer programming.

While technical skills desired by employers have changed over the years, a consistent finding in IT workforce KSA research has been an emphasis on the need for strong business and interpersonal skills as well as desirable personal traits [10] [12] [24]. These findings have been reported in studies seeking opinions from many stakeholders including: IT managers [12], system users and consultants [10], and IT professionals [24]. For example, a recent longitudinal study asked IT managers to identify important KSAs of IT workers. Employers that were surveyed consistently valued the interpersonal skills and personal traits above technical skills with honesty and integrity ranked most highly [1] [2]. Given that the need for soft skills and desirable personal traits are well known, we have chosen to focus the proposed research study on the rapidly changing technically-oriented WMT skills.

Job Advertisement Research

One research approach that has been used often to gain insight into industry needs is content analysis of IT professional job advertisements. However, both the source of job advertisements to be analyzed and the methods used have changed over time. Seminal work in this area examined print newspaper advertisements for mention of specified skills [20]. Other researchers have drawn job advertisements from trade journals

and online job-posting sites [22], whereas others have investigated skill requirements by performing a content analysis of data collected from job ads posted on the websites of large Fortune 500 corporations [9]. Unlike studies assessing stakeholders' opinions of IT skill importance, studies of job ads have, in general, found they focus more on technical skills over business and interpersonal skills [20]. As such, job advertisements represent a valuable data resource for the proposed study of WMT KSAs.

While the KSA studies previously mentioned drew job advertisements from a variety of sources, they have generally conducted their analyses by tabulating the number of times specified skills (typically from a priori lists based on previous literature) are mentioned in job ads. As technology has progressed, some researchers have introduced more sophisticated methods for investigating job advertisements. Smith and Ali [17] used an automated data mining process based on predefined keyword indexing for classification of searches to extract data from over 80,000 job ads posted on the online job agency *www.dice.com*. Data was gathered for comparison to identify trends and scarcity of talent to guide curricula. Sodhi and Son [19] developed a computer-based content analysis method to infer employers' skill requirements by analyzing over 1,000 online job ads. Although their study focused on operations research jobs, they developed a replicable empirical method to create a hierarchical taxonomy of related words and phrases to form discipline-specific categories of skills. Sodhi and Son [19] noted that tracking the changing needs of employers is useful for HR consultants who want to know which skills employers desire as well as for university program directors concerned with updating curricula. In this paper, we contribute to this stream of literature by employing a methodology that is designed for examining a content domain where key terminology is emerging or undergoing rapid change.

METHODOLOGY

Pile Sort Method

The pile-sort method [5] has been applied in anthropology as a method for cultural domain analysis [3]. Examples of domains that have been studied include color terms, kinship terms, diseases, plant terms, animal terms, airplane piloting errors, kinds of pain, and characteristics of infant feeding methods [23]. In one variation of the pile-sort method, individual 'informants' are first asked to place a set of terms into piles that contain similar items. In an unconstrained sort, there is no limit on the number of piles the informant can create [23], but an informant may be asked to place each term into only a single pile. Once an informant has completed the pile-sorting, an item-by-item similarity matrix is tabulated reflecting the co-occurrence of items across piles. These matrixes can then be aggregated across informants to derive a pooled proximity matrix. From these summaries, a spatial representation of the aggregated differences may be generated (e.g., using multi-dimensional scaling). While the traditional pile-sort method has been described as a 'simple' and 'compelling' method [4, p. 233], several researchers have noted that aggregation of judgments may not be feasible when informants' proximity judgments vary widely [8] [15].

Consensus-based Pile Sort Method

Gardiner et al. [7] proposed a variation of the traditional pile-sort method in which researchers play the role of informants, and follow a specified protocol for deriving an aggregated matrix of similarity/dis-similarity judgments. In a traditional pile-sort task, informants are not allowed to interact; in contrast, following the consensus-based pile sort method, interaction between informants is not only encouraged, but considered mandatory to ensure the success of the pile-sort exercise. Gardiner et al. [7] argue that taking an interactive conciliatory approach to the pile-sort task will be a superior approach when the domain in question is ambiguous, fast changing, or potentially open to different interpretations by informants due to different knowledge sets or experience (i.e., when informants' proximity judgments may vary widely).

In the following sections, we discuss the details of data collection of WMT job ads that are subsequently used to generate a set of terms for analysis and the anticipated application of the consensus-based pile sort method to categorize those terms.

DATA COLLECTION AND PREPARATION

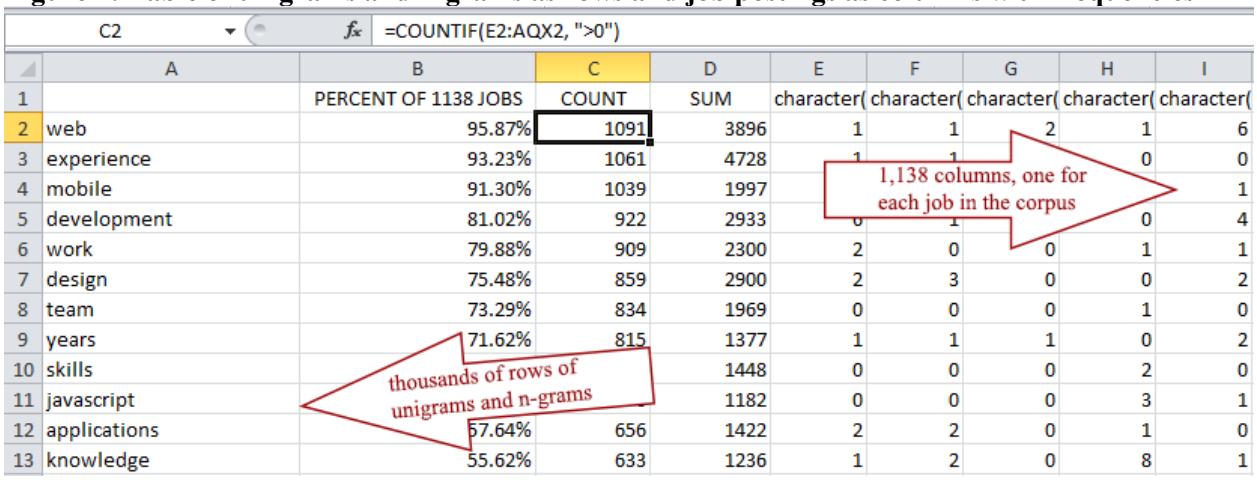
As of the writing of this paper, data collection has been completed. Job advertisements containing both the keywords *web* and *mobile* were sampled from *Indeed.com*, an online service that aggregates millions of job postings from thousands of companies. This sample was collected on June 12, 2015. The first 2,000 jobs containing the specified search terms were downloaded and analyzed.

The corpus of 2,000 jobs was examined to remove duplicate job ads and those with irrelevant job titles. Titles that included references to clerical assistance, sales, customer support, marketing, content editing or production, instruction or faculty positions, and graphic art production in which the primary job function did not involve IT skills, were removed. This resulted in 1,138 relevant job postings as the document corpus.

Using the corpus, an initial keyword dictionary was developed as follows:

1. A Python script utilizing the DOM aware Beautiful Soup library was run to cycle through the corpus of HTML files stripping the HTML markup, whitespace, and unnecessary content, and outputting them as text files with a consistent naming convention using a job number appended to the job title as the file name. For example: *Job_180 Frontend Developer*.
2. The R programming language, which is designed to explore datasets, was utilized to run a routine that removes punctuation and stop words, converts text to lowercase and performs stemming.
3. The R script generated a sparse n-gram matrix of keywords (unigrams) and phrases containing up to 8 words (n-grams) from the corpus of job descriptions. Terms are listed without using any pre-determined keywords or phrases.
4. This produced a table with rows for each n-gram token and columns for the frequency of their occurrence in each job description (see Figure 1). N-grams appearing in fewer than 2% of all job postings were removed by the R script. This resulted in 1,138 columns, one for each job, and 1,782 rows containing the terms and phrases.
5. The resulting unigram and n-gram tokens were reduced through judgment by making conceptual associations, resulting in 150 terms representing technologies and skills. This set of terms will be further analyzed using the consensus-based pile sort approach.

Figure 1: Table of unigrams and n-grams as rows and job postings as columns with frequencies



	A	B	C	D	E	F	G	H	I
1		PERCENT OF 1138 JOBS	COUNT	SUM	character(	character(	character(	character(	character(
2	web	95.87%	1091	3896	1	1	2	1	6
3	experience	93.23%	1061	4728	1	1		0	0
4	mobile	91.30%	1039	1997					1
5	development	81.02%	922	2933	0	1		0	4
6	work	79.88%	909	2300	2	0	0	1	1
7	design	75.48%	859	2900	2	3	0	0	2
8	team	73.29%	834	1969	0	0	0	1	0
9	years	71.62%	815	1377	1	1	1	0	2
10	skills			1448	0	0	0	2	0
11	javascript			1182	0	0	0	3	1
12	applications	57.64%	656	1422	2	2	0	1	0
13	knowledge	55.62%	633	1236	1	2	0	8	1

FUTURE ANALYSIS

Application of the Consensus-based Pile Sort Method to WMT Job Advertisements

Future steps in this research project will proceed using the consensus-based pile sort methodology [7]. This analysis method proceeds in multiple rounds. In the first round, multiple informants independently sort the derived terms into an initial set of suggested categories. During this stage, informants have the option of declaring a term unsuitable for any of the proposed categories, in which case, it is placed in an *Unsorted* category. At the end of this sorting round, there are likely to be some terms on whose category the informants unanimously agreed upon, and others for which researchers chose different categories. The sort results for concepts that the informants find unanimous agreement upon will then be used to refine the initial categories. Detailed definitions of the categories will be developed based on the meanings of the terms unanimously assigned to the category. This process may involve reference to the document corpus to ensure that the meaning of terms is clearly understood. If necessary, any of the proposed categories may be discarded, revised, or combined and new categories may be added.

Subsequently, a second round of sorting will be conducted using the refined categories. In the second round, only those terms for which there were previous sorting discrepancies are considered (i.e., terms that were unanimously assigned to a category in round one are not resorted). This sorting is done independently by all informants. Once completed, the sort results are tabulated and disagreements among the informants discussed and resolved (i.e. to arrive at consensus). This reconciliation process follows an established and replicable protocol including reference to the document corpus to resolve any ambiguity or misunderstanding in term usage. The end result should be a well-structured set of categories and terms representing the emerging domain captured in the document corpus. The authors anticipate that preliminary results from this analysis will be presented at the conference.

DISCUSSION AND FUTURE RESEARCH

The contribution of this research is expected to provide greater understanding of industry demand for WMT KSAs. It may help to provide university educators with an updated view of the skills and technologies most important for students to have to qualify for jobs in the web and mobile areas. Given the rapid changing nature of web and mobile technologies, the findings of this study can be used to guide curriculum development decisions IT-related disciplines.

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Gender Discrimination in the Workforce: Its Impact on Businesses and Employee Performance

Numerical Paper Research

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Abstract

This paper investigates the association between gender discrimination in four workplace areas; recruitment policies, job performing, managerial roles and wage with employee performance and firm performance in the workplace. It was hypothesized that each independent variable is positively correlated with firm performance and employee performance as independent variables in this model. Using a sample size of one hundred ninety-two (192) participants six scales were statistically measured, which include Gender Discrimination in Recruitment Polices, Gender Discrimination in Job performance, Gender discrimination in Managerial Roles, Gender discrimination in wages, employee performance and firm performance. Structural equation modeling is used to evaluate the hypotheses. Results indicate that employee performance is significantly correlated with Gender Discrimination in Recruitment Polices, job performance, and managerial roles. Also, firm performance is significantly correlated with Gender discrimination in recruitment policies and job performance.

Key words. Gender discrimination, Diversity, Firm Performance, Employee Performance, Gender, Workplace, University.

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1. Introduction

In 1973, the governmental agency of the United States that enforces federal employment discrimination laws called the Equal Employment Opportunity Commission (EEOC), sued Sears, Roebuck & Co. (Sears) for discriminating against women by denying them positions in pre-determined departments that paid commissions.[1] Nearly five decades later, the landscape has not changed. In 2015, the former employee, Katie Moussouris, filed a lawsuit against Microsoft citing unfair discrimination based on her gender. The suit alleges that the company has engaged in a system which adversely affected female employees on technical and engineering roles. Mainly affecting their performance evaluations, pay, promotions and other terms and conditions of employment. [2]

In fact, in today's workplace women continue being underrepresented at the highest levels in organizations and many with significantly lower pay and fewer promotions opportunities than men (Catalyst, 2015). Nonetheless, for the first time in history, the United States Census Bureau 2015 demonstrated that the percentage of men aged 25 and older with a bachelor's degree or higher was not statistically different from that of women (U.S. Census Bureau, 2015). The men's rounding rate is 32 percent and women's rounding rate is 33 percent.[3] Yet, women are still underrepresented out executive levels of management in must industries.

This paper takes in consideration a new perspective in gender discrimination. According to recent research, University students started detecting that gender inequality also affects men, mostly in what are called female-dominated professions (Sipe, et al. 2015). We considered that this perspective could impact the findings of gender discrimination by reducing the bias of measure, thus just considering female discrimination.

Over the past three decades, research has focused in specific areas of gender discrimination, for example: some studies have analyzed the impact of gender discrimination specifically in the health care industry (Krieger, 1990). Other researchers' efforts have focused on the effects of gender inequalities in the workplaces, Stamarski, C. S., & Hing, L. S. S. (2015) and some other papers have found how gender bias in evaluations can undersupply women to the upper or top level of organizations (Heilman, 2001). These entire findings were taken into consideration to construct this paper, it is felt all three examples of discrimination because they gave us insight on how specific industries, places and roles can affect gender discrimination in general.

Despite all the advances in the topic, studies infrequently assessed the contributions and harms that gender discrimination had on the firm or on employee performance. In light of these factors, we decided that further research in this particular context is needed. For these reasons, this study aims to demonstrate how four independent variables; (1) gender discrimination in recruitment policies; (2) gender discrimination in job performance; (3) gender discrimination in managerial roles; and (4) gender discrimination in wage are related to two dependent variables (1) employee performance and (2) firm performance.

In particular, the present analysis is focused on answering the following research question: How gender discrimination affect employee performance as well as the business performance? Even though gender stereotypes are hard to break, this research attempts to conclude that companies should value employees for his or her knowledge, since it is the most important intangible asset that a firm possess (Grant, 1996).

2. Literature Review and Hypothesis

2.1 The Relation between Gender Discrimination in Recruitment Policies on Employee and Firm Performance.

In previous literature we can observe that gender "refers to the attitudes, feelings and behaviors that a given culture associates with a person's biological sex" (American Psychological Association, 2012). Furthermore, according to U.S Equal Employment Opportunity Commission (EEOC), sex or gender discrimination involves treating someone (an applicant or employee) unfavorably because of that person's sex. In June 1964, EEOC began enforcement of the Title VII of the Civil Rights Act of 1964, this is a law that forbids discrimination on any aspect of employment, including hiring, firing, pay, job assignments, promotions, layoff, training, fringe benefits, and any other term or condition of employment in the United States (Civil Rights Act, 1964).

Since then, issues related to gender roles and gender discrimination have changed over time, but they have yet to end. For example, in 1987, Hearn & Parkin's research emphasized and recognized the effects of gender discriminations on female's workers in industries which are dominated by men (Hearn & Parkin, 1987). Conversely, in 2015 Millett and Kevelson findings

showed that gender discrimination also affect men. They found that male nurses make less than female nurses, just because nursing is socially perceived as a female-dominated field (Millett & Kevelson, 2015).

In the twenty one-Century workplace, gender discrimination is playing a new role on the overall employee performance. First, let us consider the findings of Eagly and Carli researchers. Their report demonstrates that gender bias and patriarchal paradigms, regarding gender roles, remain as significant influencers in the hiring process, as well as in promotional and career advancement opportunities in the modern workplace (Eagly & Carli, 2007). Based on the above discussions the following hypothesis is tested.

H1a. There is a significant relationship between gender discrimination in recruitment polices and employee performance.

In capitalist societies, the goal of any company is creating a profitable organization of its labor, product or service processes. Without a doubt, the recruitment process is a central component to achieve this goal, this is because recruitment enables a firm to capitalize by selecting the candidate with the best company qualifications. Leaving the primary question, "why there are so few women leading companies"? In 2015, the New York Times published an article entitled "Fewer Women Run Big Companies Than Men Named John," stating that among Chief Executives of Standard & Poor's 1500 firms, for each woman running a company there are four men named John (Wolfers, 2015).

Some evidence from adult employment demonstrates discrimination against women. For example; in Philadelphia's restaurant, which is perceived as a socially feminine industry, women candidates were four percent less likely to acquire a job interview and three point five percent less likely to receive a job position, in comparison with their male counterparts (Hellerstein, 1997). Even though these results should be interpreted with caution due to individual characteristics of candidates, it demonstrates gender implications in the workforce.
The points above lead us to another important fundamental hypothesis in this research.

H1b. There is a significant relationship between gender discrimination in recruitment polices and firm performance.

2.2 The Relation between Gender Discrimination in Job Performance on Employee and Firm Performance.

In 2016, the Washington post reported that managing performance appraisal is a valuable tool for helping the company and employee grow (Legg, 2016). In contrast, a study between Black and White managers from three different work organizations displayed that when compare to White managers, Blacks felt less accepted in the company and perceived themselves as less attractive candidates for promotions based on their job performance. Therefore, they are more likely to be less promotable and experience less career satisfaction (Greenhaus,1990). In the same fashion, a study conducted in Shah Abdul Latif University and published by the International Journal of Management Sciences and Business research in 2015 found that gender discrimination in promotion is statistically significant related with employee performance (Memon, 2015). For these reasons, we intend to examine a direct or indirect link between job performance and employee performance.

H2a. There is a significant relationship between gender discrimination in job performance and employee performance.

In the last few decades, companies have been more sensitive to various forms of discrimination and begun transitioning to a more diverse workplace. Factually, in the United States, female directors' placement on boards has been on an upward trend between 1990 and 2014, from 5.6% to 17%. In the global panoramic, fifteen countries have introduced non-binding gender quotas in their corporate governance, where these legislative actions have had significant impact in the strategic direction of enterprises (Terjesen, 2015). However, there remains interpretation disparity in the literature among researchers. Meanwhile, some researchers have found a positive link between firm performance and the female leadership integration in board of director tables (Fondas & Sassalos, 2000), other studies released showed companies who has women in their boards experienced a decrease in performance in the preceding five months (Ryan, 2005). As described earlier, a few studies have been done to test the relationship between Gender Discrimination in job performance and firm performance. Thus, the next hypothesis is test.

H2b. There is a significant relationship between gender discrimination in job performance and firm performance.

2.3 The Relation between Gender Discrimination in Managerial Roles on Employee and Firm Performance.

As mention above, gender discrimination as a topic has advanced in the past two decades, especially in equal employment opportunity and positive action policies. However, diversity and equality in employee performance for managerial roles is far from being equal. Some studies have found that gender characteristics in personality interfere with a woman's strivings to achieve the top positions. A 2016 report from McKinsey & Co, and Lean in shows that women are less likely to participate in meetings, receive challenging assignments, receive the first critical promotion to manager and have access to senior leaders. The results are severe to women of color, who reported fewer opportunities than white women (McKinsey et al, 2016).

A particular viewpoint to integrate into this research comes from Facebook's Chief Operating Officer, Sheryl Sandberg. Her book addresses the topic of gender discrimination beyond work-family life balance. Sandberg's book encourages women to take charge of their own careers and push forward despite gender bias (Sandberg, 2013). Based upon prior research and findings, a research hypothesis is proposed here:

H3a. There is a significant relationship between gender discrimination in managerial roles and employee performance.

According to a research conducted in 2006 by Columbia University, the researches Noble and Moore significantly found that the continued absence of women in a leadership positions in the workplace is due to two main reasons. First, women's leadership absence can be viewed as a human rights issue i.e., equal right and equal participation. Second, women's leadership absence may be due to poor diversity encouragement efforts in the workforce of every industry (Noble & Moore, 2006). During this research, within the literature review it must be noted that there is a female absence in Managerial or other key company roles.

Importantly, a 2015 meta-analysis was performed to investigate the relationship between female representation on corporate boards and firm financial performance. Their findings indicate firm financial performance was un-related to the mere female representation (Pletzer, et al.2015).

Consequently, recognizing that a firm's value and profitability lies within the top management skills and not in gender leadership, the following hypothesis is tested:

H3b. There is a significant relationship in Gender discrimination in Managerial roles and Firm performance.

2.4 The Relation between Gender Discrimination in Wage and Employee and Firm Performance.

In 2015, researchers considered glass ceilings and glass doors; were findings showed that women were filtered into lower paying jobs in smaller firms (Javdani, 2015). Negating the idea that women were unqualified, but that they were simply not given an opportunity to enter the higher paying firms' positions. Further, the researchers implied that a small firm's performance is not the result of having more women or that these lower paid women are less talented positions but talented women are systematically directed to smaller firms (Javdani, 2015).

The same year, research was begun focusing on merit pay and pay progression as it affected those with multiple disadvantages identity; example, white disabled men or ethnic women. The current body of work indicates a wider disparity in such groups relative to those groups with a single disadvantage identity. Once merit pay was isolated as a factor there was only nominal difference in reducing pay gaps. Among their findings "Merit pay alone has a very small impact on wage growth and Merit pay has a more favorable impact on women's pay growth than it does on people from ethnic minorities or those with disabilities"(Javdani, 2015). Moreover, Merit Pay's wage disparity reductive effects increase as the number of disadvantages an individual has to a right to claim increases.

H4a. There is a significant relationship between gender discrimination in wage and employee performance.

Spanish researchers using panel data analysis techniques found a positive link between boardroom gender diversity and firm financial performance (Campbell, 2008). Their research results stemmed from the percentage of women or board gender ratio, where the opposing causal relationship was not statistically significant. An approximation of Toblin's Q was used as the firm's value variable (Campbell, 2008). Their research demonstrated that investors were indifferent to a woman board leader, or the board having a significant female presence does not affect the firm's favor and value among investors (Campbell, 2008).

Additionally, Ntim (2015) a firm's market valuations were positively associated with its Boardroom diversity, ethnic and gender. Although this work showed more favorably for ethnic diversity than gender diversity, no evidence of a significant non-linear link was discovered (Ntim, 2015). Together these studies demonstrate that women in the corporate environment do not reduce valuations which encourage broader collaborative performance. It is here that Perryman's investigations consider the impact of gender diversity in top management teams (TMTs) on firm performance and consider "the moderating effect of gender diversity on executive compensation" (Perryman et al, 2016). Their findings were that firms with greater top management gender diversity had better performance and lower risk, yet female executives were found to be paid less than their male colleagues (Perryman et al, 2016). Discrepancies in wage must be caused by sources other than individual performance or lack luster firm performance.

H4b. There is a significant link between Gender discrimination in wage and firm performance.

3. Method

3.1 Sample

The data used and collected for this study was obtained from a large public historically black university called Savannah State University and also family and friends of researchers. Two hundred twenty (220) questionnaires were applied, one hundred ninety-seven (197) participants answered and one hundred ninety-two (192) participants completed the instrument, therefore a response rate of eighty-seven (87) percent was achieved.

3.2 Instrument

Data for this numerical paper were collected using a survey titled: "Gender discrimination in the Workforce; Its impact on Businesses and Employee Performance". This questionnaire was based on three IRB approved Research instruments created from prior researchers. For this research model, the items used under the construct Gender discrimination in Job performance, were obtained from an instrument created by Daniel E. Gberevbie, Adewale O. Osibanjo, Anthonia A. Adeniji and Olmuyaiwa A.Oludayo (2014) which examines gender discrimination and employee performance. Items used under Gender discrimination in the Recruitment Polices, Gender Discrimination in Managerial Roles and gender discrimination in wages, were a combination between the previous instrument and On Pay Gap, Millennial Women Near Parity-For now, created by Pew Research Center called.Firm performance and Employee performance construct were entirely obtained from On pay gap, millennial women near parity (2013) Survey. Items in each construct use the five point Likert scale from 1 (strongly Disagree) to 5 (Strongly agree), with the exception being the demographic information form.

3.3 Demographics

The surveys concluded with eight demographic questions. The background information form (BIF) contains six topic questions: gender, race, work experience, income, education, and job consistency. Responses that were missing some of these items were removed. Table1 shows the breakdown of demographic items on number of responses and percent.
Respondents were primary females (61%), African American (64%), between 26 and 34 years (39%) with at least 6 years of work experience (51%), and bachelor degree achieved (36%).

3.4 Procedures

The data set used in this paper were obtained through regular classes, meetings and campus application surveys. The instrument consists of a total of five pages and takes approximately 20 minutes to complete. Participants involved in this research were volunteers who answered the survey which was applied at Savannah State University and were asked to complete six instruments: gender discrimination in recruitment polices, job performance, managerial roles, wages, firm performance, employee performance and background Information form (BIF).

Table 1. Demographic characteristics (n=192)

Gender			
1	Male	73	**39%**
2	Female	119	**61%**
Race			
1	Caucasian	24	**13%**
2	African American	124	**64%**
3	Hispanic	14	**7%**
4	Asian	12	**6%**
5	Native American	5	**3%**
6	Pacific Islander	0	**0%**
7	Other	13	**7%**
Age			
1	18- 25	63	**32%**
2	26-34	75	**39%**
3	35-54	43	**25%**
4	55-64	7	**3%**
5	65 +	4	**2%**
Work Experience			
1	None	9	**5%**
2	0- 2 years	29	**15%**
3	2-4 years	25	**13%**
4	5-6 years	30	**16%**
5	6 years and more	99	**51%**
Income			
1	None	16	**10%**
2	Under $10,000	38	**19%**
3	$10,000 - 29,000	52	**27%**
4	$30,000 – 49,000	30	**16%**
5	$50,000 - +	99	**51%**
Education			
1	High School	39	**20%**
2	College	38	**20%**
3	Bachelor degree	69	**36%**
4	Professional degree	33	**17%**
5	Phd or Certifications	13	**7%**

3.5 Measures

On this research, each construct was analyzed with an internal consistency of the instruments measured using Cronbach alpha reliability estimate. The Cronbach alpha reliability of gender discrimination in the recruitment policies is 0.409. Gender discrimination in job performance construct is combined by five items scale and has the reliability alpha value on this construct is 0.474. A similar five items scale measures the Gender discrimination in Managerial Roles construct and a Cronbach's Alpha value of 0.663 was obtained for this scale. Firm performance scale consists of five items and a alpha value of 0.608 was obtained in this scale. Employee performance uses a five items scale and Alpha value of 0.652 was found in this scale. The alpha value for all the scales don't meet the minimum threshold level indicated (0.70)

4. Results

4.1 Explanatory Factor Analysis and Confirmatory Factor Analysis

In order to identify the underling relationship between variables, the statistical Exploratory factor Analysis (EFA) was used. As result, the gender discrimination in wages construct was excluded due to the insignificance relationship between the variables measured. Previous individual test on eight hypotheses, a confirmatory factory analysis (CFA) was performed to assess the discriminant validity of the model. Table 2 demonstrates the results obtained. The remained five constructs can be significantly measured by three items each one. Overall, the results indicated that our hypothesized measurements items provided an acceptance fit to the data.

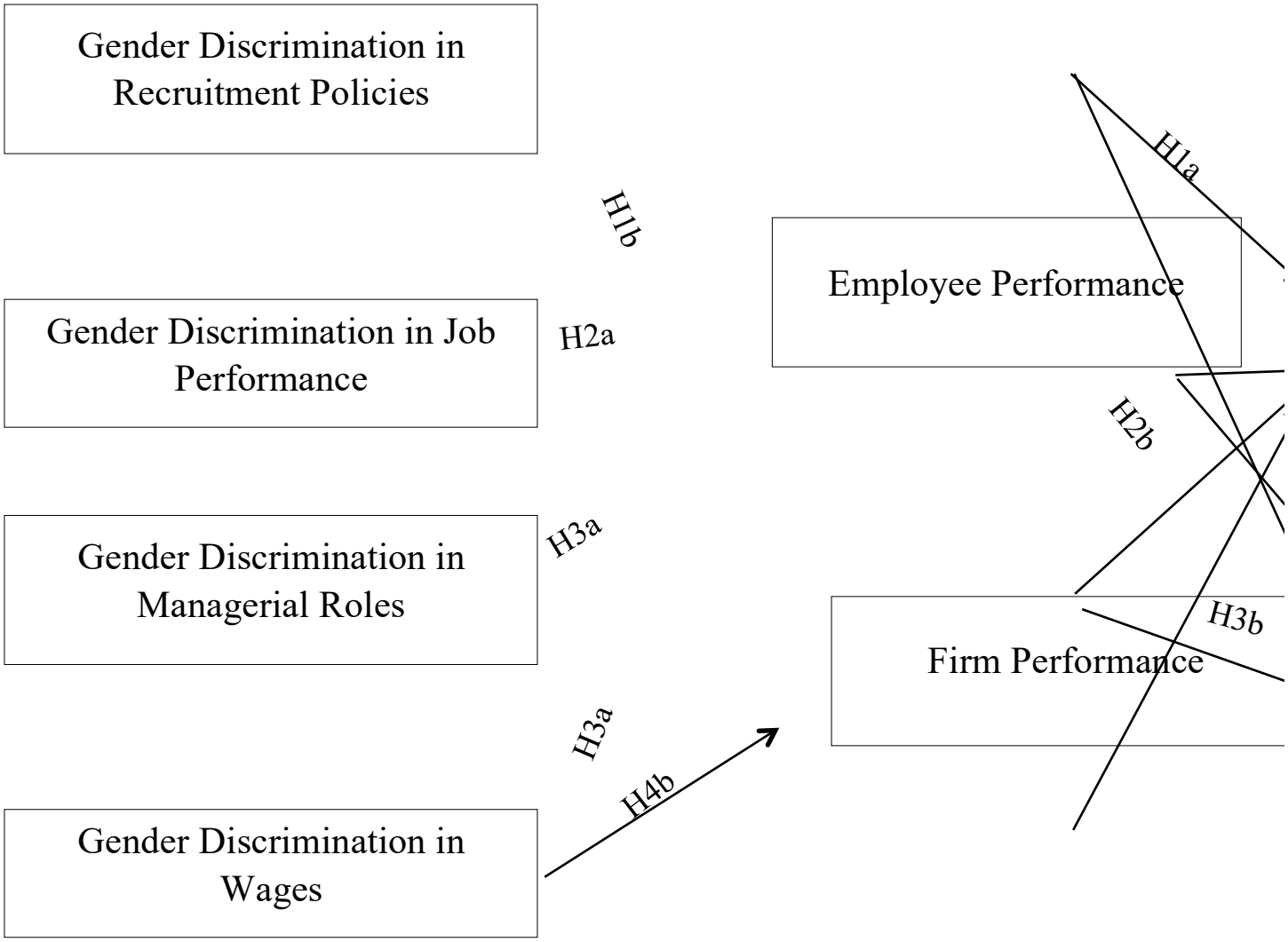
Table 2 Confirmatory Factor Analysis Table

Rotated Factor Matrix[a]

	Factor				
	1	2	3	4	5
EP4	0.630				
EP5	0.401				
EP6	0.787				
GDMR1		0.696			
GDMR2		0.772			
GDMR3		0.460			
FP1			0.700		
FP2			0.712		
FP5			0.363		
GDJP2				0.414	
GDJP3				0.446	
GDJP4				0.496	
RGDRP1					0.352
RGDRP2					0.342
GPRP3					0.391

4.2 Hypothesized Model

A hypothesized conceptual model of Gender discrimination in the workplace; Its impact on businesses and Employee performance.



4.3 Correlation Analysis and Sample Statistics

A correlation analysis was conducted. Table 3 consists of mean, CR, AVE, standard deviation (SD), Cronbach alpha (a) and zero-order correlations for all variables included in the model.

It can be concluded that Employee Performance is significantly correlated with Gender Discrimination in recruitment polices (r=0.283, p= 0.0006), Gender Discrimination in Job Performance (r= 0.247. p = 0.005) and Gender Discrimination in Managerial Roles (r= 0.185, p=0.0102).
Firm Performance is also significantly correlated with Gender Discrimination in Recruitment Polices (r= 0.181, p= 0.011), and Gender Discrimination in Job Performance (r= 0.189, p=0.008).

Table – 3 Means, CR, AVE, SD, a, Standard Deviation, Zero-correlations, and Reliability Estimates.

Variables	Mean	CR	AVE0.416	DS	A	EP	FP	GDRP	GDJP	GDMR
EP	7.11	0.672	0.416	3.299	0.652	0.645				
FP	13.29	0.434	0.271	1.739	0.608	.041	0.521			
GDRP	8.96	0.691	0.443	2.970	0.409	.283**	.181*	0.666		
GDJP	10.35	0.649	0.437	2.765	0.474	.247*	.189**	.261**	0.661	
GDMR	9.46	0.477	0.239	3.215	0.663	.185**	.192	.212**	.198**	0.489

Reliability estimates are on the diagonals in parentheses; SD Standard Deviation
** Significant at the 0.01 level * Significant at the 0.05 level
Variable denotes categorical variable
EP = Employee Performance
FP = Firm Performance
GDRP = Gender Discrimination in Recruitment Polices
GDJP = Gender Discrimination in Job Performance
GDMR= Gender Discrimination in Managerial Roles

4.4 One-way ANOVA

A One- way ANOVA analysis is performed to test gender as categorical variable and the differences in Gender Discrimination in Recruitment Polices, Gender discrimination in Job Performance, Gender Discrimination in Managerial Roles, Firm Performance and Employee Performance.
Results on table 4.

Table 4 One-Way ANOVA testing Procedure for the Categorical Variable Gender (n=192)

Gender [1]	F-Value	p-value
GDRP	2.480	.086
GDJP	1.620	.201
GDMR	.953	.387
FP	1.194	.305

EP	3.137	.046*

** Significant at the 0.01 level * Significant at the 0.05 level
[1] variable denotes categorical variable
GDRP = Gender Discrimination in Recruitment Polices
GDJP = Gender Discrimination in Job Performance
GDMR= Gender Discrimination in Managerial Roles
FP = Firm Performance
EP = Employee Performance

An additional One – way ANOVA table analysis is performed to test Race as categorical variable to measure the differences of the same constructs.
Table 5 is annexed.

Table 5 One-Way ANOVA testing Procedure for the Categorical Variable Race (n=192)

Race [1]	F-Value	p-value
GDRP	1.826	.110
GDJP	2.035	.076
GDMR	.669	.648
FP	2.335	.044*
EP	.461	.805

** Significant at the 0.01 level * Significant at the 0.05 level
[1] variable denotes categorical variable
GDRP = Gender Discrimination in Recruitment Polices
GDJP = Gender Discrimination in Job Performance
GDMR= Gender Discrimination in Managerial Roles
FP = Firm Performance
EP = Employee Performance

In order to understand how Income differ from all the variables, a Third One-way ANOVA analysis using SPSS were conducted. Table 6 provides the results.

Table -6 One-Way ANOVA testing Procedure for the Categorical Variable Income (n=192)

Race [1]	F-Value	p-value
GDRP	.604	.660
GDJP	2.626	.036*
GDMR	.188	.944
FP	4.783	.001**
EP	1.488	.207

** Significant at the 0.01 level * Significant at the 0.05 level
[1] variable denotes categorical variable
GDRP = Gender Discrimination in Recruitment Polices
GDJP = Gender Discrimination in Job Performance
GDMR= Gender Discrimination in Managerial Roles
FP = Firm Performance
EP = Employee Performance

4.5 Structural Equation Model (AMOS)

A two-step approach was employed to test the present model using a structural equation method on AMOS software. The first step was to check if the model has an acceptable fit. Second step is to conduct a path analysis for the model and interpret structural coefficients.

A covariance-based structural equation modeling is used for analysis. Prediction-oriented measure that are parametric used for the evaluation of the covariance-based structural equation modeling (hair t al.;, 2009). Fit indices like, GFI (Goodness-of-Fit Index), NFI (Normative Fit Index), RMSEA (Root Mean Square Error Approximation) and CFI (Comparative Fit Indices) are reported in CBSEM (Hair et al, 2009) The goodness of fir indices compares the models absolute fit by comparing the fitted model with the actual data, and the values range from 0-1. Values greater than 0.9 indicate acceptable fit.

Chi-squares in one of several measure used in assessing the overall model fit, and "assess the magnitude of discrepancy between the sample and fitted covariance matrices" (Hu &Bentler, 1999:2), larger the value of Chi-Square the poorer is model fit for the same degrees of freedom. Since Chi-square value is heavily dependent on the degrees of freedom, and the value of Chi-Square is always large when the sample size is large, a better measure is relative (or) normed Chi-square (x2/df) (Wheaton et al., 1977) GFI and AGFI proposed by Joreskog and Sorbom is an alternative to Shi-square (Tabachnick&Fidell, 2007). A value of 0.9 and above for GFI and AGFI are considered to be indicators of good model fit (Miles&Shevlin,1998). The room mean square error approximation (RMSEA) was also considered here, since it provides an estimate of measurement error. CFI compares the predicted covariance matrix to observe covariance matrix.

4.6 Interpretation of Structural Model

The RMSEA less than 0.08 is indicative of a acceptable model (MacCallum et al., 1996), RMSEA value of the current model is equal to 0.067, indicating a good fit. The GFI value of this model is .906, the recommended. NFI as is 0.699 and GFI is.826, both acceptable threshold levels. Table 8 indicates the index.

The unstandardized structural path coefficients for the model and if the paths are significant. Gender recruitment practices, gender managerial roles, firm performance, employee performance and gender job performance are all endogenous variables. The squares multiple correlations (SMC) , which indicate the amount of variance explained by exogenous variables is provided in Table 5. For all endogenous variables, the Chi-square is 118.626 with a 80 degrees of freedom.

Based on the results, no support was found for hypothesis 1a. This means that the perceived notion that gender discrimination in Recruitment policies had non-significant impact on employee performance. To test hypothesis 1b a bivariate correlation analysis was conducted between two recruitment policies and firm performance, and a non-significance was found with these two variables (r = .029, p = .134). Based on the results from Table 5, there was no significant support to hypothesis 2-b. No support was provided for the relationship between firm performance and job performance with these two variables (r = .025, p = .131).

Based on results from Table 5, support was established for hypothesis 2-a. The relationship stated that there is perceived correlation between employee performance and firm performance variables (r = .018, p = .314)

Table 7 Fit Indices for the Baseline Model

Model	X2 (df)	p-value	X2/df	RMSEA	GFI	NNFI	NFI	CFI
Baseline	1.27	0.636	1.27	0.067	0.609	N/A	0.699	0.826

Statistics are based on a sample of 192 respondents.

Table 8 Unstandardized Structural Coefficients for the Model

Parameter	Path Coefficient	R- Square
GPRP3	.0697	
RGDRP2	.027	
RGDRP1	.001	
GDMR3	.001	
GDMR2	.001	
GDMR1	.001	
FP2	.001	0.436
FP1	.053	
EP5	.001	0.416
EP4	.001	
EP5	.001	
GDJP$	.001	
GDJP4	.001	
GDJP2	.001	

5. Discussion

The purpose of this study is to measure the relationship that gender discrimination in recruitment polices, job performance, managerial roles and wages have into employee performance and firm performance.

Using a One-way ANOVA analysis we found that Gender has a significant impact on Employee performance, but it does not have significance in firm Performance. In contrast, the variable race demonstrates a significant correlation on Firm performance and not in Employee performance. A third analysis One-way ANOVA with Income as factor establishes a correlation on Job Performance as well as in Firm Performance.

Exploiting a correlation analysis it is possible determined that Employee performance is strongly related with Gender discrimination in Recruitment polices. This significance confirms the findings early stated by Eagly and Carli in 2007. Therefore, gender discrimination in recruitment polices have a significant impact in the employee performance.

A second result indicated that Employee performance is also correlated with job performance. Thus, gender discrimination has the possibility of impact on Employees performance. This founding grounds the conceptual framework by Memon 2015 and Greenhaus 1990 which were previously cited in this paper.

A third statistical correlation where found between Employee performance and Managerial Roles. Consequently, it is possible observe that gender discrimination in an employee performance could increase or decrease the participation of individuals in managerial roles.

Our findings concluded that firm performance has a convincing correlation with recruitment polices and job performance. Thus, gender discrimination on job practices has an effect in the overall firm performance.

Moreover, it was found that firm performance has not correlation in gender discrimination on managerial roles. Which is consistent with the results provided by Columbia University in 2006 staying that the absence of female leadership could be explained by the lack of equal female participation.

Previous researches present evidence about wages and it correlation with employee performance and firm performance, however this study could not provide evidence on this construct.

6. Limitations and Future Research

Because findings on Explanatory Factor Analysis indicated that Gender Discrimination in Wage are not property measured to be correlated with employee and firm performance, overall results are not conclusive on wages. Future research is recommended.

In all constructs, Cronbach's alpha demonstrated a value that doesn't meet the minimum threshold level indicated (0.70). Therefore, Cronbach alpha below 0.7 reflect an internal inconsistency. Performed additional analyses are suggested.

It is also important to knowledge that a large proportion of survey participants belong to African American people (n= 124, 64%) hence, the results of this study does not have a diverse population and may be subjected to changes over a increase sample in population background.

This study is limited only to savannah state university population, in a specific location on the country and could potentially have cultural and generational bias.

The initial purpose of this research was considered childhood experiences and Interdepartmental experiences as moderator of the model. This mean, find if these characteristics can strength or weak the relationship between variables and independent variables. However, the necessary analysis were not performed and reported in this document. Therefore, use of this data in order to expand findings is suggested.

As researchers, it is significant for us that future research could expand the present study outcomes to prevent gender discrimination in workplace. Exploring the positive correlations among Employee performance and Gender discrimination in Recruitment policies, job performance and managerial roles can increase awareness among university students, and future workforce generations.

Finally, it is our desire that future researchers grow our outcome by following the implications, limitations, results and challenges encounter on these findings.

7. Conclusion

To conclude, we have developed a model that conceptualize companies and employees impacts throughout gender discrimination practices. For us, it is important that firms understand how diversity practices and inclusion interact to foster a better climate in job performance. Based on these findings, companies can evaluate how gender discrimination in recruitment policies does have an impact in employee and firm performance. More important, employee performance is strongly correlated with managerial roles and job performance; the presence of gender discrimination on these company's practices can increase or decrease employee performance. This study understands the importance of value diversity and creates equal opportunities to a enhance employee and firm performance.

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GINI-BASED CLASSIFICATION AND ITS APPLICATIONS IN DATA MINING

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ABSTRACT

Gini-based classification is a rank-based classification, which takes into account both the variate values and the ranks. The methodology relies only on first order moment assumptions hence it is valid for a wider range of statistical distributions. This paper begins with reviewing formulation types of Gini-based classification and surveys the main properties, efficiency, and selection biases. Gini-based classification under independent censoring and co-variate-dependent censoring are reviewed as well. Several empirical evidences for variable selection bias with the Gini-based classification from the literature is presented. We then discuss statistical explanations for variable selection bias in different settings by identifying several main sources of variable selection bias, such as estimation bias, variance effects and multiple comparisons effect. Gini-based classification method can be modified to overcome the bias problems, by normalizing the Gini indexes with information about the splitting status of all attributes.

Related literature reviews on Gini-based classification and detection are compared. Practical applications of the Gin-based classification are discussed in terms of big data analytics and artificial intelligence for medical diagnoses. Gini-based classification can be extendible to categorical and ordinal predictor variables and to other split selection criteria in data mining.

The paper outlines several future research opportunities for Gini-based classification. Several challenges remain in the area of modeling of classification, clustering and detection using Gini-based classification, many of which require efforts from various discipline groups. Our paper is interdisciplinary and makes contributions to both the Gini literature and the literature of statistical inference of performance measures in data mining.

GROUPING STUDENTS ACCORDING TO IT-RELATED ETHICAL BEHAVIOR: AN APPLICATION OF THE CLUSTERING ALGORITHM

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ABSTRACT

Information technology is widely used by college students. However, the extent to which students are ethical when using Information Technology is questionable. In an attempt to understand the ethical use of Information technology, this study is developed. This study is concerned with the students' knowledge and intent to act ethically. In order to do so, the data is collected by the distribution of a survey. Development of the survey is not within the premises of the study. The survey replies are coded into numerical values. The data is further processed and prepared for the application of the mining algorithm. This study aims to categorize students into groups according to their knowledge level. In order to so, Microsoft clustering algorithm is applied. The results reveal students with the highest ethical knowledge acts least ethically.

INTRODUCTION

The aim of this study is to understand the behavioral intentions of IT/IS students to act ethically when using technology. The rationale for examining ethics as it relates to IT is two-fold. First, students graduating from IT programs will be the stewards of appropriate and ethical use of IT in the workplace. The second is that ethics is part of the accreditation standards for IT programs and, therefore, part of curriculum and assessment. In order to assess the behavioral intentions to acts ethically, the students' ethical knowledge of IT and behavioral intentions will be analyzed using a survey instrument.

The phrase "ethical knowledge in IT" refers to how each of these groups refers certain actions in terms of technology use as ethical or unethical. These groups will be assessed on their responses to certain factors, some of them being plagiarizing work, research papers, citations, sharing passwords, internet surfing during the class, usage, and distribution of pirated software as well as installing software on multiple computers for a single license and other essential factors that fall under the generic definition of the term ethics.

Behaving ethically when using information technology has been a pressing issue over the years as information technology has gained popularity. In many instances, it was found that the unethical use of information technology was popular amongst all age group accessing using IT. However, one of the most prevalent age groups found to behave unethically when using information technology is college students between the ages of 18 to 24. Several studies have been conducted to better understand the reason for unethical behavior while using information technology.

This study aims to examine and analyze certain ethical actions when using information technology as well as the knowledge possessed by students regarding ethical behavior. In order to do so, the data for this study will be collected using a survey method. The survey covers a wide array of IT ethical use scenarios (constructs) and individuals answering the survey questions will be asked to rate each. The survey was distributed to students who had voluntarily decided to sign up for participation in the survey. Qualtrics is the survey tool used. The data from the survey is collected in three phrases. The answers to the questions is measured on a Likert scale. In order to understand what the different categories of students are in regards to ethical behavior and knowledge, the survey data will be

analyzed using the data mining technique of clustering. Clustering finds the groups of students that are most similar with regards to ethical behavior and knowledge.

LITERATURE REVIEW

Unethical use of software results in massive losses to business and organization in addition to it being illegal and a severe breach of ethical behavior. Not only is one acting irresponsibly and causing harm, it reflects poorly on the organization as well as on the society. Unethical behavior in the usage of Information Technology is prevalent amongst students, professionals, and members of society (Jones, 1991). Over the years, much research has been conducted to understand the underlying reasons behind acting unethically.

While some studies aim to understand the reasons behind acting unethically (Riemenschneider et al., 2011, Woodward and Hodis, 2007), others propose methods to develop the ethical behavior amongst individuals (Masrom et al., 2009, Karim et al., 2009). Additionally, there are studies which reflect upon how age, the environment, the individual's financial condition, peer etc. influence them to act ethically or unethically (Jones 1991, Dioniso et al., 2013, Akman and Mishra, 2009, Martin and Woodward, 2011). Many studies have used this measue, whether the intent of the study was to understand the reasons behind certain behavior or how an educational institution had developed the students to act ethically or the environment of their workplace (Ramayah 2009, Masrom et al., 2009).

As this study aims college students and ethical use of IT, the next section reviews literature related to this study.

Unethical Use of IT in College Students

Unethical use of information technology has been prevalent among student populations in a variety of ways. For example copying books, buying photocopied books instead of the original ones, use pirated software, sharing software with a single license, streaming music, peer to peer sharing of files, academic dishonesty for example copy pasting etc. are common behaviors (Moore and McMullan, 2009, Borja et al.,2015). There has been several studies which attempt to understand the reason behind these behaviors **(**Dionisio et al., 2013, Jung 200), or why actions like copying books or software piracy is preferred by college students and potential ways to develop more ethical sense in students (Liu and yang, 2012, Karim et al, 2009).

Photocopying books or buying pirated copied books are a very common phenomenon in college students. One known cause of students participating in the pirating of books is the price of the textbooks motivating students in lower income situations to have a greater tendency to participate in the pirating of books than those in higher income situations (Dionsio et al., 2013). The further analysis implies that females are less likely to participate in such behaviors due to fears of repercussions the student may face if caught (Dioniso et al., 2013).

The current environment of online music, available through streaming or by download, has encouraged unethical behaviors in young college students (Borga et al., 2015, McMullan, 2009). This has resulted in music retailers and creators suffering financial losses (McMullan, 2009). Students that typically stream music through online channels are found to more likely engage in downloading pirated music (Borga et al., 2015). This behavior is common among peers of those pirating software when the behavior is found acceptable and encouraged by others around them (Borga et al., 2015). Another belief among students about pirated music is their perception that they are contributing to the musician's popularity which helps peers choose which musician they want to see in a live performance (McMullan, 2009).

The environment of the school or organization, ethics classes, and how the majority of students in a school behave when using technology are all factors which are considered when assessing the reasons behind the popularity of unethical behaviors in college students. Not all schools are found to have offered ethics courses. In schools where the ethics courses were offered, students were found to behave more ethically when using the internet compared to schools which do not offer ethics courses (Masrom et al, 2009). In ethics classes, the activity of students working in a group and discussing the possible ethical or unethical situations helps to bring out their ethical knowledge in using the nternet. If the professor is able to notice the areas where the students in his/her class lack, they can address that area and help them develop stronger ethical sense (Riemenschneider et al. 2011)

METHODOLOGY

This study aims to assess the categories of students that exist with regards to their IT ethical knowledge and their behavioral intentions. The plan is to see how the ethical actions for each of the constructs relates to the ethical knowledge in students. The independent variables are the ethical action and knowledge constructs in the survey as described in Table 1. Because we aim to group the knowledge construct with respect to the ethical actions, there is no dependent variable. Therefore, in the data mining field, this study can be classified as unsupervised. As a result, the unsupervised data mining technique of clustering is used.

Using the Microsoft clustering algorithm, students are categorized in group based on their possession of ethical knowledge and ethical behavioral intentions. Students are provided with a set of questions related to ethical behavior. Additionally, a set of questions is given to evaluate their ethical knowledge. These questions are summarized in Table 1. These categories reflect the level of the ethical action and the corresponding IT ethical knowledge the students possess.

The tool Microsoft SQL Server Analysis Services (SSAS) is used in this study and the Microsoft clustering algorithm is used as the data-mining algorithm. Before application of the algorithm, the data set is prepared. The knowledge questions are aggregated by calculating the average. Similarly, questions for intellectual property rights are aggregated by calculating the average. The same is done for fair treatment, privacy rights, misuse of information technology and software piracy.

For the purposes of this study, one mining structure is developed. The independent variables of this mining structure are average knowledge, privacy rights, intellectual property rights, fair treatment, and software piracy. The algorithm parameters are kept to the default settings in SSAS.

Data Set

The purpose of this study is to measure the ethical knowledge in college students. To achieve that goal, the data set should contain information about students approach to various ethical scenarios related to IT, their intention and their attitude towards the ethical use of technology. Thus keeping the purpose of the study in mind, a survey was designed and distributed. College students majoring in information technology related degree programs are the target audience. Dr. Cheryl Aashiem and Dr. Jeffrey Kaleta in collaboration with Dr. Paige Runner developed the survey. The data collected from this survey is being used with their permission for this study.

The survey has 12 constructs. Each construct has a set of questions. The survey has questions related to the intent to act ethically, behavioral measures, knowledge and demographics. This study is concerned with the students' knowledge and intent to act ethically. The questions related to the intent to act ethically are categorized as intellectual property rights, software piracy/copyright, IT misuse, privacy rights, and fair treatment. The actual questions and constructs are provided in Table 1. Each section of the survey started with the phrase "It is unethical for me to …" The responses are measured on a five point Likert scale with 1 equivalent to strongly disagree and 5 equivalent to strongly agree. In addition, there are demographics questions that include education, ethnicity, age, and marital status.

In addition to the questions in Table 1, the data set comprised of other columns generated by Qualtrics. They are start data, end date, distribution, respondent ID, IP address etc. These constructs are irrelevant to the study. Of these columns, only respondent ID is included in the data set. Given the unique nature of the ID, this is designated the primary key. The final count of the columns is 88. There are 73 rows. The header of each column corresponds to question number in the survey.

Table 1 : Description of Data

Construct	Survey Questions
Intellectual Property Rights (IPR)	Take credit for someone else's work
	Hire someone to write an essay
	Purchase or submit a research or term paper from the internet to a class assignment
	Cheat on a graded assignment
	Cheat on an exam
	Plagiarize other people's work without citing or referencing the work
	Add the name of a noncontributing person as an author in a project/research
	Copy and paste material found on the Internet for an assignment without acknowledgment
	Deliberately provide inaccurate references for a project or research study
	Knowingly permit student work done by one student to be submitted by another
Software Piracy (SP)	Make a copy of software for personal or commercial use
	Make a copy of software for a friend
	Download pirated software from the internet
	Distribute pirated software from the internet
	Buy software with a single user license and then install it on multiple computers
	Share a pirated copy of software

	Install a pirated copy of software
Misuse of Information Technology (MUSE)	Surf the internet for personal interest and non-work related purposes at work
	Misuse computing or technology resources
	Be involved in the act of phishing (unauthorized stealing of people's valuable
	Be involved in the act of email spoofing (deformation of email for phishing
	Surf the internet for personal interest and non-class related purposes during
	Use social media networking as a tool for cyberbullying
Privacy Rights (PR)	Ignore strict confidentiality rules regarding privacy and proprietary matte...
	Disclose confidential organizational information to coworkers without authority
	Violate the privacy and confidentiality of information entrusted to me
	Violate other people's privacy with the use of internet monitoring devices
	Use technology to infringe on other people privacy rights
	Provide unauthorized access to other people's personal information
	Provide unauthorized access to an organizations private information
Fair Treatment (FT)	Take action if I catch someone involved in unethical use of computing resource
	Advice in an honest and trustworthy manner to enable people to behave ethically
	Be ethical in my behavior in all aspects of life
	Protect fundamental human rights
	Respect the diversity of all cultures
	Abide by and not violate the laws of the country and community
	Report any violations of ethical regulations to an authority
Knowledge (AVG KNOW)	I am very knowledgeable about behaving ethically with information technology
	Among my family and friends, I am one of the experts on behaving ethically
	I feel very knowledgeable about behaving ethically with information technology
	Compared to most other people, I know more about behaving ethically
	When it comes to behaving ethically with information technology, I really do

Data Acquisition

Data collection via survey requires IRB approval. After multiple phases of development of the survey, the questions for the survey finalized. An application was made to IRB for data collection. The data collection process began after receiving the approval from IRB. According to the regulations of IRB, upon getting students approval, the survey was distributed. This survey is anonymous and voluntary.

A tool called Qualtrics is used to distribute the survey. The survey was open for one week for the students who agreed to take part in it. The data collection took place in three phases. Initially, the data set consisted of 16 rows, in the second phase, the number increased to 53 rows and finally, the data set has 73 rows. The data imported from Qualtrics is in CSV format. Given the nature of the questions, the data is in categorical format. However, when the survey was designed, each categorical replies was assigned a numeric value. Qualtrics provides users with the option of downloading data in both categorical and numeric format. For the purposes of this study, the data exported is in numeric format.

Data Preparation

Data preparation is an integral part of every data-mining project. Often times the data collected is in raw unstructured format. This means the data usually does not have headers, it is not in comma-separated version, there are no specific columns etc. This implies that the data cannot be imported into a database which is required for SSAS. Hence, it is not ready for mining by the application of data mining algorithms.

However, for the purposes of this study, the data is collected using a survey. The data exported is in CSV from the survey tool Qualtrics. All of the values are in numeric format. Each column has headers corresponding to the questions. The nature of the data was such that it was in a range, as defined in Qualtrics by the survey designer. Because there are ranges and each answer corresponds to a specific value, the volume of noisy data is minimal as well. Additionally, the Qualtrics settings are such that, without responding to a certain question, one could not proceed to the next. Hence, the volume of missing data is also minimal. However, after examining and studying the data, the data set has missing data as respondents could quit the survey before finishing.

Data preparation in this study involves identification of noisy and missing data, handling that data, data normalization, and exploration. However, given the nature of the survey, there was not much need for data preparation. The following sections discuss in details as to how the data is prepared for the study. Additionally the questions or each construct is collapsed into one column. This is done by calculating the average. Finally given the range the value is categorized in low, medium and high categories.

The original data set comprises of 73 rows. After looking at the entire data, 6 rows were identified as having the same value for every question. Thus, these rows were removed.

The dataset has only one row with missing data and this row is removed from the analysis. After removing the rows with missing data and the rows with the same value for all questions, the data set has 66 rows.

Data Exploration

Data exploration is the first step of processing the data. This step is a quick way of finding the relationship between variables. Data exploration helps summarize the main characteristics of the data. For the purpose of this study, the data is explored in excel using a chart. Demographics data are collected for this study as well. This include data for age, ethnicity, college level and marital status. However, these variables are not used in this study. Therefore, it is not included in data exploration. Table 2 contains a summary of the questions and frequency of responses for each answer option.

Table 2 : Data in each categories of the constructs

Construct	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
Intellectual Property Rights (IPR)					

IPR_1	47	16	1	1	8
IPR_2	45	11	6	4	7
IPR_3	50	1	4	1	8
IPR_4	44	15	5	5	4
IPR_5	45	14	5	2	7
IPR_6	43	17	2	2	9
IPR_7	29	20	13	6	5
IPR_8	35	16	7	5	10
IPR_9	36	23	4	1	9
IPR_10	41	13	9	1	9
Software Piracy (SP)					
SWP_1	14	16	17	9	9
SWP_2	10	15	18	12	10
SWP_3	15	13	18	8	11
SWP_4	25	13	11	8	8
SWP_5	11	16	14	11	13
SWP_6	21	12	16	6	10
SWP_7	17	13	17	7	11
IT Misuse (MUSE)					
MUSE_1	4	22	16	18	5
MUSE_2	8	33	13	5	6
MUSE_3	47	11	3	--	4
MUSE_4	47	12	2	--	4
MUSE_5	7	15	18	14	11
MUSE_6	44	13	1	3	4
Piracy Rights (PR)					
PR_1	35	21	3	2	4
PR_2	42	16	3	--	4
PR_3	45	12	4	--	4
PR_4	38	15	3	4	5
PR_5	41	15	2	2	5
PR_6	41	15	4	--	5
PR_7	42	16	1	1	5
Fair Treatment (FT)					
FT_1	12	25	15	6	7
FT_2	20	19	11	8	7
FT_3	26	15	7	9	8

FT_4	30	13	5	8	8
FT_5	32	8	5	7	13
FT_6	24	14	12	7	8
FT_7	21	16	14	7	7

IT Knowledge (KNOW)							
	Strongly Agree	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Strongly Disagree
KNOW_1	1	--	--	1	11	28	24
KNOW_2	1	1	4	4	6	30	23
KNOW_3	1	--	--	4	5	30	25
KNOW_4	2	--	1	6	6	28	22
KNOW_5	15	10	4	6	3	16	11

Model Planning and Building

After data preparation, the data is now ready for mining. Microsoft SQL Server Analysis Services (SSAS) is the data-mining tool used. Although this tool comes with a series of data mining algorithms, for the purposes of this study the Microsoft clustering algorithm is used. Before application of the data-mining algorithm, the data is imported into the database. The database used in this study is Microsoft SQL Server.

The data is imported as a CSV file to SQL Server as a database. The database is connected to SSAS. After establishing the connection with the database, the mining structure is created. The independent variables are the averages of intellectual property rights, fair treatment, software Piracy, privacy rights, misuse of Information technology and average knowledge. The algorithm parameters are kept as the default settings.

After application of Microsoft clustering algorithm, the system generated a cluster diagram. The data set is grouped into three clusters. The cluster is read from the tab cluster profile. The clusters are given names according to the representation of knowledge with respect to the ethical actions. The following section discusses the evaluation and interpretation of the clusters.

RESULTS

From the cluster profiles the clusters are evaluated. Depending on the representation of the knowledge the constructs are named. Cluster 1 is named medium ethics, cluster 2 is high ethics and cluster 3 low ethics as that is how they are related to one another with respect to the overall average ethics for each construct. For each cluster, there is a centroid. Each clusters have a different level of knowledge. Figure 1 shows the cluster profiles from SSAS.

From Figure 1, we can see that the knowledge level for cluster 1 (medium ethics) is moderately low. However, fair treatment (FT AVG) is in between moderate and high. Intellectual property rights

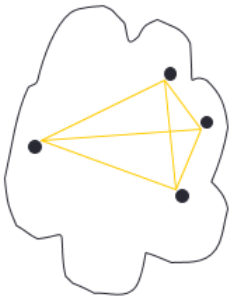
(IPR AVG) and privacy rights (PR AVG) is high. However, misuse of information technology (MUSE AVG) and Software Piracy (SWP AVG) is towards the lower end.

For cluster 2 (high ethics) the AVG knowledge is higher than cluster one. All other constructs except fair treatment (FT AVG) is high. However, fair treatment is in the range between high to moderate.

For cluster 3 (low ethics) the knowledge level is high and intellectual property rights (IPR AVG) is the lowest. Privacy rights (PR AVG) fluctuates throughout the range. Software piracy rights and misuse of information technology fluctuates between medium to low. Fair treatment varies between medium to high.

Table 3 portrays the centroids for each construct in the respective cluster. The centroids are used to calculate the sum of squared error, one measure of the quality of the clusters. This is done to evaluate the performance of the Microsoft clustering algorithm. Sum of squared errors is a good measure for comparing clusters. It is used to measure the goodness of a cluster and the cohesion within the clusters. Figure 1 demonstrates the concept of cluster cohesion. Medium cluster has the highest cohesion and the high cluster but high cluster has the lowest cohesion at 8.98

Figure 1: Cluster Profiles



cohesion

Figure 2: Cluster Profiles

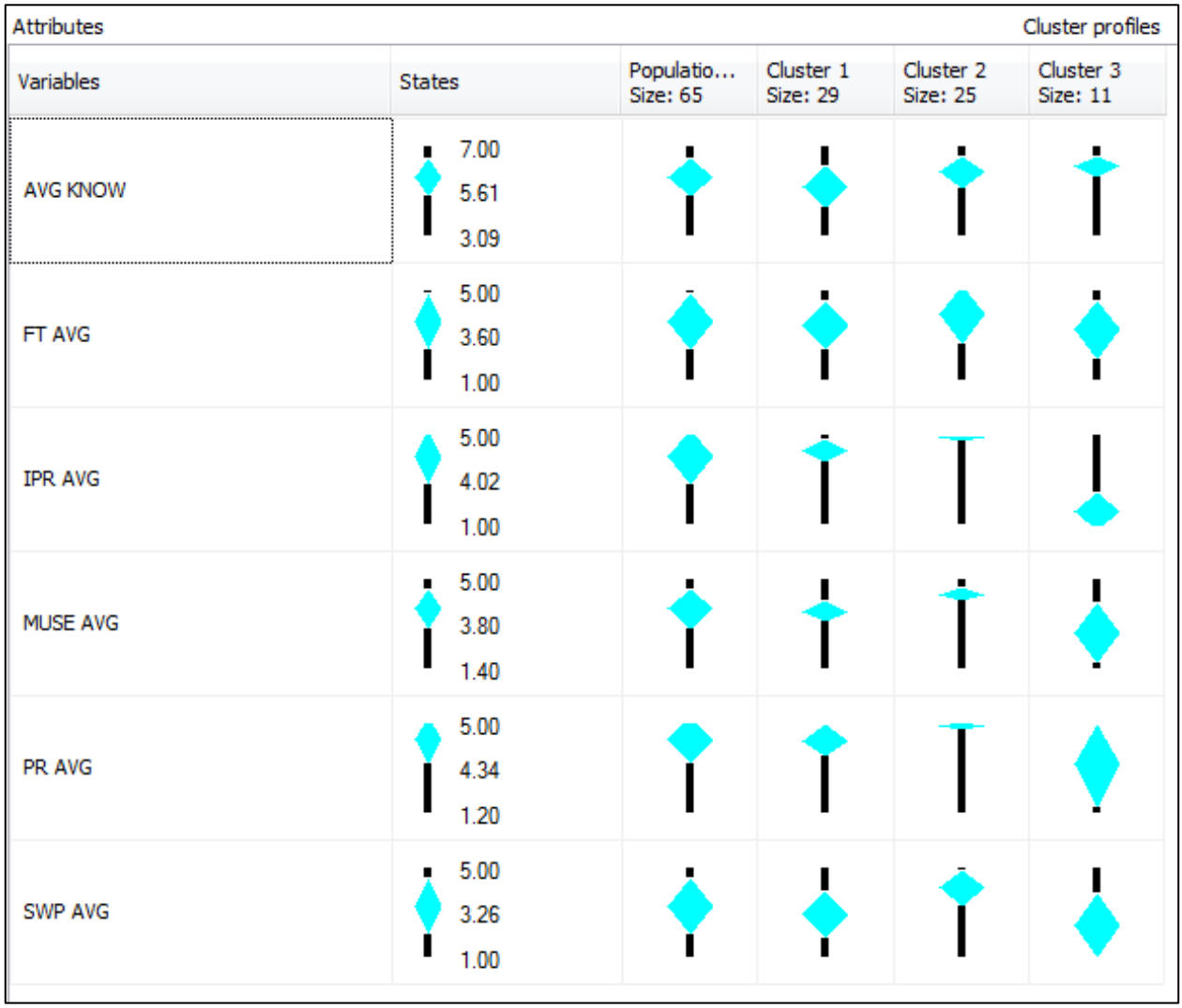


Table 3: Centroids of each construct in the respective cluster

Cluster	AVG KNOW	FT AVG	IPR AVG	MUSE AVG	PR AVG	SWP AVG
1: Medium ethics	5.2	3.45	4.25	3.67	4.34	3.26
2: High ethics	5.85	3.94	4.85	4.37	4.91	4.07
3: Low ethics	6.09	3.22	1.57	2.83	3.24	2.4

CONCLUSION

This study aims to categorize students into groups according to their knowledge level. For the purpose of this study, the data collection is via the survey technique. After much preparation of the data, the data mining technique Microsoft clustering algorithm is applied. This algorithm categorized the students into three groups. These categories are influenced by their ethical actions. The clusters are named according to the knowledge level as depicted by SSAS

From the groups it is seen that, students who acts least ethically has the highest ethical knowledge. However students whose ethical actions are between high to moderate, they have medium ethical knowledge. The centroids for each construct is determined from the application. This is used to calculate the sum of squared error. From the calculation results, High ethics cluster, has the best cohesion with minimum SSE. After evaluating the clusters and the SSE calculation, the conclusion is ethical knowledge does not necessarily result in students' ethical behaviors. How students act ethically is irrelevant of their behavior. The cluster high knowledge is the best example of this inference.

Future works of this study will include collection of more data. In order to evaluate the knowledge and the ethical actions, supervised techniques like decision tree is planned to apply on the clusters. It is anticipated that this will help uncover significant relationships. The discovery will aid to understand ethical behaviors of students, and find out potential reasons as to why students behave unethically.

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GUIDELINES FOR EVALUATING THE VALIDITY OF A STATISTICAL STUDY IN A GENERAL EDUCATION STATISTICS COURSE

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ABSTRACT

A statistical study could be biased or invalid even when conducted by a researcher with a good reputation. It is the responsibility of the reader to critically examine a study's conclusion for accuracy and to discover hidden biases or invalid conclusions. In this paper, we give some guidelines that students can use to critically evaluate the validity of the methodology and conclusion of a statistical study.

1. INTRODUCTION

The advent of the Internet has led to huge data collection by academicians and those who use data to make money. Thus, there is an easy access to data which has led to proliferation of statistical studies. In the past, all statistical studies had to go through a strict review process before they can be accepted for publication. Unfortunately, things have changed. In this new era of electronic journals, open access journals, and private websites, the quality and accuracy of statistical studies cannot be assumed. All statistical studies must be evaluated for accuracy.

In the process of teaching a general education statistics course for years, I have come to realize that many of my students believe that any information obtained from the Internet is accurate. We know that this is not true. To help my students become discerning users of statistical information, I usually give them statistical studies to evaluate based on my pre-defined criteria. In this paper, I will share with you some of the criteria that my students use to evaluate statistical studies.

2. GUIDELINES FOR EVALUATING STATISTICAL STUDIES.

The following are some useful guidelines for critically evaluating the validity of a statistical study. These criteria are not exhaustive, but I hope that they get you started in the process of helping your students become discerning users of statistical information.

2.1 Validate the Goals and Study Design

The first important step in setting up a statistical study is to have a good design. The goal, population, and sampling technique used in the study should be clear to the reader. As the reader goes through the report, the reader should ask and answer the following questions:

- What is the goal or the question to be answered in this study?
- Is the population well-defined and appropriate?
- What type of statistical study was conducted: observational, experimental or meta-analysis?
- Did the researcher take steps to control placebo and confounding effects?

In an effort to answer these questions, which are not exhaustive, the reader should have a good idea as to whether the study was properly designed or not.

2.2 Know the Source of the Study

Anybody or organization has a right to carry out a statistical study. In some of the studies, the individual or organization may be interested in results that support its viewpoint. While there is nothing wrong for an organization to use a statistical study to further its objectives, it is the responsibility of the reader to read between the lines and to avoid being misled.

2.3 Examine the Sampling Method

The popular phrase “garbage in, garbage out” also applies to statistical studies. Even though the study design may be sound and the source credible, the study result could be biased or invalid if the sample was not properly chosen. In going over the study report, the reader should pose and answer the following questions:

- What sampling technique was used in data collection?
- Was the sample large and representative of the population?
- Was the sample chosen through a **voluntary response**? A voluntary response occurs if participants volunteer to be in the study. The problem is that such participants tend to have strong feelings about the issue and hence their opinions may be biased.

2.4 Determine How Variables were Defined and Measured

In a statistical study, we attempt to measure how one variable affects another or how the variables relate. If the variables are difficult to define or measure, then we could have a statistical study that is confusing or one that means different things to different people.

Consider the following study on beer flavor: Which beer tastes better? Fifty beer drinkers are randomly selected and blind folded. Each person in the group is given two different brands of beer to drink and to

record if the first or the second beer tastes better. The study concluded that the first bear brand tastes better.

The problem with this study is the fact that many people have different concepts of what makes something taste better. For something people, taste better means it is sweeter; and for others taste better could mean neither sweet or bitter. There are many possibilities. In a study like this, the author should tell readers how to measure "taste better."

2.5 Consider Confounding Variables

Recall that a confounding variable is a variable that affects a study's outcome but was not considered in the design of the study. Obviously, the presence of a confounding variable will confuse or invalidate the result of the study. As you read any study, think of variables that could affect the study's outcome but were not controlled during the study.

Consider, as an example, a pharmaceutical company who tested its new cholesterol reducing pill in a city nicknamed the "Fat City of the World" in the summer of 1987. The study found that the cholesterol level of everybody in the study had reduced by at least 80%. After the study design, however, the average price of regular gas in the city increased from $1.99 to $10.99, an increase of over 450%. As a result, many city residents had to walk more than usual to grocery stores, banks, super markets, et cetera. Could more walking by residents, which was not considered in the study, play a part in the cholesterol reduction observed in the study? A reader of a statistical study should be able to pose and answer questions that could reveal the presence of confounding variables.

2.6 Look for Misleading Graphs

Graphs are great tools for data visualization and exploration. Unfortunately, graphs can be drawn in such a way that they are deceptive or misleading. When reading a statistical study, our students should look for misleading graphs as they could be used to suppress or exaggerate relationship between variables in a study.

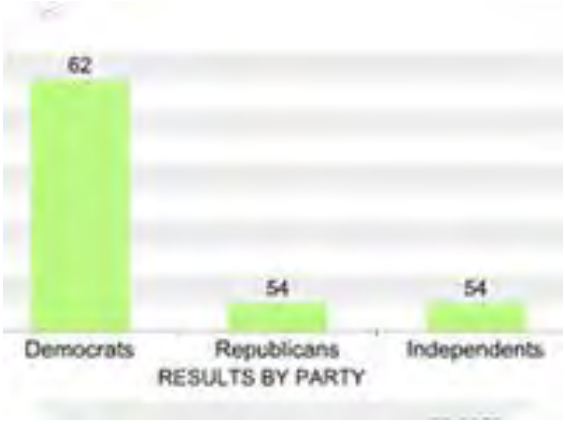
As an example, consider the Terri Schiavo's Life Support Case. Theresa Marie Schiavo, aka Terri, was comatose for about 15 years, 1990—2005. This case became a national issue when the husband wanted her taken off life-support but the parents said no. Eventually, the case was decided in favor of the husband by the Courts.

Figure 1: Picture of Terri Schiavo

Source: https://en.wikipedia.org/wiki/Terri_Schiavo_case

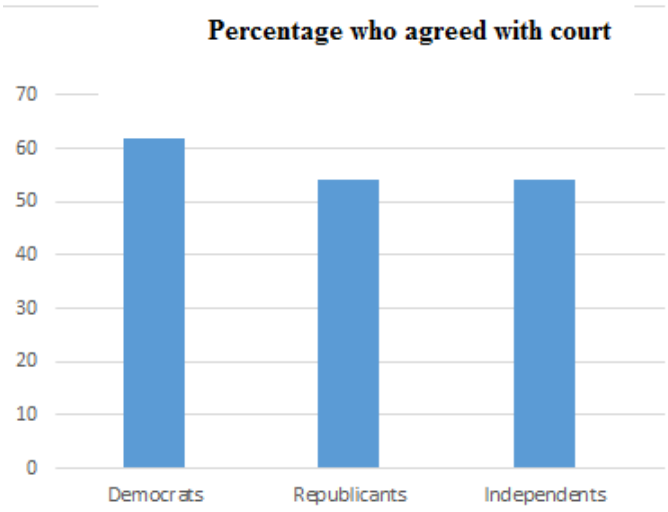
The media giant CNN conducted a survey to determine how adult Americans agreed with the Courts on taking her off life support on the basis of party affiliations. According to CNN, 62 % of Democrats, 54% of Republicans, and 54% of independents agreed with the courts. Figure 2 is the bar graph that CNN drew to visually represent the results of the surveys. This graph is misleading as the vertical scale does not start at zero. Notice the exaggerated differences among the bar heights. CNN did redraw a non-leading graph after Mediamatters.org pointed out the misleading nature of the graph. The accurate and non-misleading graph for the study is given in Figure 3. Observe that in the non-misleading graph, the differences in the bar heights are not much. The over exaggerated nature of the misleading graph was certainly of concern to all who cared about fairness.

Figure 2: CNN Misleading Graph



http://www.adweek.com/tvnewser/schiavo-cnns-absurd-misleading-graph/5724; July 25, 2015

Figure 3: Non-misleading graph for the CNN survey



It is not unethical to draw a graph in which the vertical axis does not start at zero or other misleading graphs. However, it is the responsibility of the reader to give appropriate interpretations to these graphs as they read statistical studies.

2.7 Scrutinize the Study Conclusion

Suppose that a statistical study is well-defined and professionally conducted. Does it mean that the conclusion should be accepted without scrutiny? The answer is no. It is possible for a researcher to misinterpret study outcomes. Hence, the conclusion of statistical studies should be evaluated against well-defined criteria. The following are the questions I ask my students to answer as they evaluate a statistical study.

- Does the conclusion agree with the stated goal?
- Is the conclusion a partial answer to the stated goal?
- Does the conclusion make sense?
- Is the conclusion statistically significant?
- Is the conclusion of practical significance or useful?
- Are there other ways that the stated conclusion can be explained?

3. CONCLUSION

A statistical study could be biased. Students should be equipped with the skills they need to evaluate these studies for accuracy. This is important because of the availability of data and the consequent proliferation of statistical studies.

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GUIDING VALUES AND THE COLLECTIVE UNDERSTANDING OF COLLEGE STUDENTS

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Communication in the workplace is pertinent, and mission statements should demonstrate the utmost clarity as they reflect the foundational expectations for members of the organization. However, miscommunication in the workplace can often be attributed to individuals giving the same words different meanings. Especially, when language relates to business values (Weber, 2015). Although mission statements and codes of ethics should shape our actions within their respective organizations, research has shown a knowing/doing gap (Apgar, 2008). We believe this gap could be attributed to inconsistencies among interpretations of different values esteemed within an organization. In efforts to investigate this gap, we solicited 52 senior level college business students (77% male) to participate in a survey. Our survey listed the first 10 business-related values from a larger alphabetized list: accountable, authority, balance, broad-minded, change, collaborative, commitment, competence, cooperative, and courage. Each of the values had a list of 10 different definitions, wherein students were asked to select the most appropriate definition. Of the 10 values defined, students were the most inconsistent in selecting the most appropriate definition for the term "collaborative." The other values came at a much higher agreement rate: accountable (96%), authority (100%), balance (92%), broad-minded (85%), change (85%), commitment (92%), competence (88%), cooperative (88%), and courage (92%). Although research has demonstrated there is a knowing/doing gap for organizations' mission statements, our findings do not suggest this gap is due to inconsistent interpretations of business value vocabulary. Rather, our findings might suggest that the sampled business schools are synonymous when communicating business value vocabulary. However, given the limitations of sample size, geography, ethnicity, and a skewed male-to-female ratio, this study should be seen as a foundation for future research in this area.

HAS THE SUPERIOR COURT OF BRUNSWICK COUNTY, NC ESTABLISHED A SYSTEM OF INJUSTICE THAT DISCRIMINATES AGAINST *PRO SE* LITIGANTS IN A MANNER THAT VIOLATES THE SUBSTANTIVE DUE PROCESS CLAUSE OF THE FOURTEENTH AMENDMENT TO THE U.S. CONSTITUTION?

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ABSTRACT

The primary purpose of this article is to enhance the awareness of *pro se* litigants that the Superior Court of Brunswick County, North Carolina may have established a system of injustice that discriminates against *pro se* litigants in a manner that violates the Substantive Due Process Clause of the Fourteenth Amendment to the U.S. Constitution. In this regard, the instant article has significant public interest not only for pro se litigants, but also for any person associated with the legal community as well as legal scholars.

Specifically, this article argues that the procedural posture of the case study reveals that the Superior Court of Brunswick County, North Carolina (NC) has established a system of injustice that discriminates against *pro se* litigants in a manner that violates the Substantive Due Process Clause of the Fourteenth Amendment to the U.S. Constitution. More specifically, through an analysis of the procedural posture of the case study, this article shows a system of injustice established by the Superior Court of Brunswick County, NC that is applied to a *pro se* plaintiff, as follows.

First, a Brunswick County, NC superior court (trial court) judge, unlawfully dismisses the case of a *pro se* plaintiff against two defendants under N.C.R. Civ. P. 12(b)(6).[1]

[1] *See* Transcript of **6 February 2015** Motion Hearing; Order of Dismissal.

Second, when the *pro se* plaintiff attempts to have the order of dismissal reviewed by the N.C. Court of Appeals (by filing a first notice of appeal), before the appeal is docketed in the N.C. Court of Appeals, the same trial court judge (a) unlawfully dismisses this first appeal[2] and (b) contemporaneously issues said plaintiff a Gatekeeper Order, *sua sponte*, without "Notice" and an "Opportunity to be Heard."[3] The issuance of the Gatekeeper Order in this manner by said trial court judge purposefully (1) deprives the plaintiff of Substantive Due Process, in violation of the Fourteenth Amendment to the U.S. Constitution,[4] and (2) has the effect of preventing or obstructing the appeal of both (a) the order of dismissal and (b) the *sua sponte* Gatekeeper Order itself[5].

With respect to the plaintiff's appeal of the unlawful order of dismissal, after said appeal has been dismissed within the system of injustice established by the Superior Court of Brunswick County, NC, the *pro se* plaintiff is forever foreclosed forever from perfecting his statutory right of appeal.

> "There is no inherent or inalienable right of appeal from an inferior court to a superior court or from a superior court to the [appellate division]." *In re Halifax Paper Co.*, 259 N.C. 589, 592, 131 S.E.2d 441, 444 (1963).
>
> "Our own Supreme Court has . . . held that the right to appeal in this state is purely statutory." *State v. Joseph*, 92 N.C. App. 203, 204, 374 S.E.2d 132, 133 (1988), *cert. denied*, 324 N.C. 115, 377 S.E.2d 241 (1989).

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[2] *See Order Granting Defendant's Motion to Dismiss Plaintiff's* [First] *Appeal*.
[3] *See* Transcript of **8 June 2015** Motion Hearing, p. 7.
[4] *See Gatekeeper Order* ("If Plaintiff files or attempts to file any motion, pleading or other document without the certification" ["by an attorney duly licensed to practice in the State of North Carolina, stating that the certifying attorney finds the filing to be compliant with Rule 11 of the North Carolina Rules of Civil Procedure"], "Plaintiff shall be held in contempt of court . . ."), p. 3.
[5] *See Order Dismissing* [Plaintiff's] *Appeal of* [the] *Gatekeeper Order*, entered **5 February 2016.**

> Among the statutes expressly providing for an **appeal of right** is N.C. Gen. Stat. § 7A-27 (appeals of right from courts of the trial divisions). APPEALS LIE FROM THE SUPERIOR COURT TO THE APPELLATE COURT AS A MATTER OF RIGHT rather than as a matter of grace. *Harrell v. Harrell,* 253 N.C. 758, 117 S.E.2d 728 (1961). Of course, the *pro se* plaintiff may otherwise file a petition for certiorari with the

appellate court, but said plaintiff has been completely and irrevocably deprived of his statutory right to appeal the trial court's unlawful order of dismissal, thereby depriving the plaintiff of Substantive Due Process ("Access to Court"), as guaranteed by the Fourteenth Amendment to the U.S. Constitution.

Third, the *pro se* plaintiff attempted to have the Gatekeeper Order reviewed by the N.C. Court of Appeals (by filing a second notice of appeal). However, with respect to the *pro se* plaintiff's appeal of said Gatekeeper Order within the system of injustice established by the Superior Court of Brunswick County, NC, the plaintiff's appeal of the Gatekeeper Order is obstructed to the extent that the *pro se* plaintiff is required to file CERTIFIED documents with the trial court (pursuant to the Gatekeeper Order) in perfecting his appeal, unless the plaintiff receives a temporary stay of said Gatekeeper Order.

Notwithstanding the foregoing, the *pro se* plaintiff was able to appeal the trial court's *sua sponte* Gatekeeper Order. However, before the plaintiff's appeal was docketed in the N.C. Court of Appeals, within the system of injustice established by the Superior Court of Brunswick County, NC, the same trial court judge unlawfully ordered the dismissal of the plaintiff's appeal of the trial court's *sua sponte* Gatekeeper Order[6], thereby forever depriving the *pro se* plaintiff from perfecting his statutory right to appeal said Gatekeeper Order. In the case study, the trial court judge even refused to allow the *pro se* plaintiff an "Opportunity to be Heard" on the

[6] *See Order Dismissing* [Plaintiff's] *Appeal of* [the] *Gatekeeper Order*, entered **5 February 2016.**

matter,[7] thereby depriving the *pro se* plaintiff of Substantive Due Process, in violation of the Fourteenth Amendment to the U.S. Constitution. Of course, the *pro se* plaintiff may otherwise file a petition for certiorari with the appellate court, but within this system of injustice established by the Superior Court of Brunswick County, NC, said plaintiff has been completely and irrevocably deprived of his statutory right of appeal, thereby depriving the *pro se* plaintiff of Substantive Due Process ("Access to Court"), in violation of the Fourteenth Amendment to the U.S. Constitution.

There is one final aspect to this system of injustice established by the Superior Court of Brunswick County, NC that is of public interest. In particular, in the case study, the superior court judge delegated to defendants' counsel the responsibility to prepare the orders (sometimes in advance) to be signed and entered by the superior court judge. In the case study, these orders included findings of fact and conclusions of law either (a) never adjudicated by said superior court judge or (b) inconsistent with prior orders.[8] Here again, the *pro se* plaintiff has been deprived of Substantive Due Process, in violation of the Fourteenth Amendment to the U.S. Constitution.

In a case study approach, the three primary objectives of this article are:

(1) To establish the procedural posture of the case study;

(2) To establish the law at issue; and

[7] In the **5 February 2016** Motion Hearing, the trial court judge refused Plaintiff an "Opportunity to be Heard" on Defendants' *Motion to Dismiss* [Plaintiff's] *Appeal* of the Gatekeeper Order. *See* Transcript of **5 February 2016** Motion Hearing, p. 10.

[8] *See Order Dismissing* [Plaintiff's] *Appeal of* [the] *Gatekeeper Order*, entered **5 February 2016**. Superior court judges are estopped from amending (or making additional) (a) findings of facts or (b) conclusions of law that change the substantive rights of the parties. N.C.R. Civ. P. 52(b).

(3) To apply the law at issue to the procedural posture of the case study for the purpose of identifying U.S. constitutional implications for the *pro se* plaintiff.

This article argues that if these objectives are met, the procedural posture of the case study reveals that the Superior Court of Brunswick County, NC has established a system of injustice that discriminates against *pro se* litigants in a manner that violates the Substantive Due Process Clause of the Fourteenth Amendment to the U.S. Constitution. In this regard, the instant article has significant public interest not only for pro se litigants, but also for any person associated with the legal community as well as legal scholars.

In a case study approach, this article accomplishes its primary purpose and objectives in a stepwise fashion as follows.

- In Part I, the procedural posture of the case study is established.
- In Part II, the law at issue is identified.
- In Part III, the law at issue is applied to procedural posture of the case study actual for the purpose of identifying U.S. constitutional implications for the *pro se* plaintiff.

In Part IV, implications of the findings in Part III for pro se litigants, persons associated with the legal community, and legal scholars are presented.

Heuristics in Business and Economics

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According to Gigerenzer and Gaissmaier (2011), “Heuristics, are efficient cognitive processes, conscious or unconscious, that ignore part of the information”. In this view, heuristics are simple rules of thumb that can be successfully used in situations of irreducible uncertainty and complexity. The more dominant view of heuristics, heuristics and biases, studies instances where people make less than rational or biased judgments, and attaches these instances often to the use of heuristics. In their initial research, Tversky and Kahneman (1974) argued that three heuristics, namely availability, representativeness, and anchoring and adjustment can be used to explain the processes underlying a wide range of intuitive and often fallible judgments.

Interestingly, social scientists are not the only group, or the first group, who use and study heuristics. Engineers, computer scientists, and mathematicians, as well as theoreticians in many scientific fields have been using heuristics, simple rules, and rules of thumb extensively as strategies for problem solving. Gathering the ways in which different fields define heuristics and spelling out the similarities and differences between these definitions is a theme of this paper.

The other, more specific goal is to survey the different conceptions of heuristics stemming from different psychological approaches to human decision-making processes. The paper demonstrates which concepts have or have not been extended to economics and other business disciplines. It specifies instances where the study of adaptation, use of heuristic strategies, and less-than-rational behavior is modeled in behavioral economics. It argues that in cases where the predominant conception of heuristics has been adopted in behavioral economics, the implications for understanding and describing decision processes can be traced back to the traditional neoclassical economic theory of rational decision-making.

Finally, it illustrates the ways in which the less explored extension of simple heuristic strategies to economic behavior holds operational promises, which can shed light on our understanding of puzzling behavior in economic markets. Examples from the prevalent use of simple rules in entrepreneurial domain provide a fruitful area for turning the focus of the study of heuristics from being a source for biased judgment to a functional way of treating the actual problem at hand.

HOW MUCH TIME SHOULD BE SPENT ON EACH OF THE FOUR MAJOR AREAS OF COMPETENCY IN THE NEW MSIS 2016 MODEL CURRICULUM?

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ABSTRACT:

The purpose of this paper is to present the findings of a study to determine the percentage of the Master of Science curriculum in information systems that should be allocated to each of the four major areas of competency in the MSIS 2016 Model Curriculum [**1**]. These competency areas include: Individual Foundational, Computing, IS Management, and Domain. A focus group comprised of alumni, industry representatives, and faculty/staff using the World Café approach arrived at consensus time allocations that represent the emphasis that should be placed on the four major competency areas. This is especially important because we offer two different masters programs. The first is a traditional course semester approach and the second is a weekend, executive module approach. Both programs have the same learning outcomes but different emphasis. The results of the study are being used to guide curriculum planning.

BACKGROUND:

In January 2016 the Department's Masters Program Committee began its biannual review of the master's curriculum. The Committee became aware of the effort to create a new model curriculum by the Joint ACM/AIS MSIS 2016 Task Force. The new model curriculum is based on four areas of competency (Individual Foundational, Computing, IS Management, and Domain) in Figure 1 below.

Figure 1[1]

The 2006 Model Curriculum emphasized knowledge areas and courses such as systems development, networking, etc. the 2016 Model Curriculum emphasizes areas of competency. The emphasis has switched from what you know to applying what you know.

The change in emphasis a more experiential approach for preparing IS professionals to solve strategic and management challenges faced by organizations that are facing changes in how business and workflow processes are being impacted through evolutions (sometimes revolutions) in information and physical infrastructure architectures. Whereas industry relied on masters programs to provide more advanced knowledge of hardware, software, database, networking, and security tools, techniques and processes; the organization prepared the professional for the application of this knowledge. The 2016 Model Curriculum assumes more pre-master's competencies, allowing for a greater concentration on preparing IS professionals through applying advanced concepts.

Upon the release of the first draft of the 2016 MS in IS Model Curriculum the IS department's master's curriculum committee began an internal review with the goal of determining the viability of the new proposed curriculum during the spring 2016 semester. As a matter of validating the conclusions of the committee's findings, a Focus Group session to determine if the changes in the model curriculum aligned with approach used to prepare IS professionals for the future challenges faced by organizations was scheduled to facilitate the validation process. The findings from the Focus Group were an indirect measure to validate of how much emphasis should be placed on the areas of competency.

METHODOLOGY:

The VCU IS Department invited industry partners, alumni, students, faculty, and staff to a Focus Group forum in order to obtain direct feedback on the MSIS 2016 curriculum recommendation from the joint ACM/AIS Task Force. The purpose of the Focus Group was to determine the proportion of time that should be allocated to each of the four competency areas as outlined in the 2016 MSIS Model Curriculum.

The over thirty participants who participated in the forum were represented in the following groups:

__9__ Industry

__7__ Alumni (graduates & students)

_19_ Academic (faculty & staff)

The World Café methodology [2] was used to facilitate the Focus Group exchange of ideas, perspectives, and rationales for how much time should be dedicated to each of the four competencies. Three rounds of exchanges were 'choreographed' so that a rich and energetic dialogue was created. Each café table was managed by a moderator, with a scribe who recorded

salient comments made during the exchanges. Each round was timed such that quick bursts of dialogue exchanges kept the café participants focused and attentive to the task.

- Round one was designed to determine the best allocation of time spent in each the competency areas for the two different master's programs: executive and traditional. The results of each café table's comments were posted and upon conclusion of round one, each table presented their findings.

- Round two addressed the allocation of categories within the competency areas. As in round one, the results of each café table's comments were posted and upon conclusion of round two, each table presented their findings.

- Round three centered on recommending how to implement the MS in IS curriculum. This round consisted of discussions about observations and recommendations related to "how" the program is delivered. There were four categories for which input from Focus Group participants were asked to comment: Making it Real, Co-Curricular, Evaluation, and Content Delivery. Summary descriptions of these categories used to describe how to implement the programs included:

    1. **'Making it Real'**: In what types of projects should the students be engaged? What about consulting? What services could students provide?
    2. **Co-Curricular**: How much time/value should be placed on mentoring, coaching, professional development/trips to conferences, networking, giving back/contributing to the community? How best can the activities be accomplished?
    3. **Evaluation**: How should student performance (pass/fail, graders, inflation issues) be determined; Use standardized assessments versus program specific evaluation protocols?
    4. **Content Delivery**: What delivery formats are most appropriate (face to face vs. online vs. hybrid and what %s); what pedagogical approach to employ (calendar start/stop times, compressed time frame, etc.)

In rounds one, two and three, the results of each café table's comments were posted on flip charts and upon conclusion of each round; each table presented their findings. These summaries were arrived through a nominal group technique which reaches a consensus list among the participants. These recommendations and comments were not filtered or weighted in any way. They collectively represent the opinions of the all the individual attendees.

In addition to the three rounds of World Café exchanges to determine what competency areas in the curriculum should receive more time to emphasize the importance in preparing master's students, a wrap-up at the conclusion of the session invited the participants the opportunity to provide additional feedback. These comments and those that were provided by 'write-ins' who wanted to participate in the Focus Group session but whose schedule conflict did not allow attendance, were recorded and they are articulated as shown in Appendix 1.

Two MSIS Curricula:

The Virginia Commonwealth University (VCU) Information Systems Department offers two MSIS programs. One program has the traditional format of evening course offerings that centers on course content that is designed to prepare students who primarily have entered the program directly after graduating from an undergraduate information systems program, or very shortly after securing a job want to continue their academic career by pursuing a graduate degree. The second program format is offered as an alternating-weekend program designed around a set of four content modules that uses specific courses to achieve the program learning objectives. Each represents a different orientation, yet both provide advanced specialized content that is learned through applying the knowledge acquired from these programs.

I. **Traditional-Evening MSIS Program:** "…The Evening MSIS program requires that new students first satisfy any necessary prerequisite and foundation courses upon entry to the program and then complete a total of 10 graduate courses… The program consists of 30 graduate credit hours including four core courses (12 credit hours), and six (18 credit hours) Information Systems electives…"The Master of Science program in Information Systems (MSIS) is designed to prepare students for specialized, senior level positions in information technology management. Graduates are trained in the planning, organizing, managing, designing, configuring and implementing of information systems and in using state-of-the-art technologies, methods, techniques, and tools. This program provides a graduate level, technically-oriented curriculum that focuses on the design and development of information systems to solve real-world problems… Graduates of the MSIS Program will serve as senior leaders within the IS profession and as strategic business partners within the enterprises in which they work… This program provides a technically oriented curriculum focused on the design and development of information systems to solve real-world problems. Graduates are hired to fill significant roles in planning, organizing, managing, designing, configuring, and implementing information systems using state-of-the-art technologies within organizations. Students in this also program have the option of pursuing a concentration in *Information Risk, Security, and Assurance.* A wide variety of companies employ our graduates. " [3]

   The MSIS program curriculum is comprised of the following learning outcomes:

   1. An ability to communicate and network effectively within the profession and within organizations
   2. An ability to serve the profession by applying knowledge broadly
   3. An ability maintain key technical expertise in order to sustain required levels of competitiveness
   4. An understanding of information technology as it applies to business contexts and the skill to apply this technology effectively in specific circumstances
   5. An ability to develop efficient and effective IS solutions using appropriate technologies that can deliver competitive advantages to organizations
   6. An ability to develop and incorporate changes in the planning and management of IS resources based on an increased understanding of the dynamic changes in the organization, IS, and global environment.

A Course/Learning Outcomes Map is provided in Appendix 3. The screen-capture of the map is somewhat difficult to read, however, the intent is to include sufficient information regarding the courses and learning outcomes that translate to the competency areas proposed in the MSIS 2016 Model Curriculum.

II. **Executive Program:** "The Executive MSIS (alternate weekend) format - Focuses on information technology management and is designed for students with three or more years professional experience. The 30-credit hour program curriculum is comprised of 10 courses that are grouped into broad topical areas called modules." [4,5] The modules focus on (1) Organizational foundations, (2) IS Foundations, (3) IS Enterprise and Global Challenges, and (4) Global Topics in Information Systems. More specific descriptions of each module and the learning objectives are as follows:

MODULE 1: Organizational Foundations—This module is designed to help IS professionals understand the challenges, opportunities and risks involved in information systems management and leadership. Students examine the issues involved in determining the needs for the planning, acquisition and implementation of information systems that support and maintain business operations in an efficient, effective, and ethical manner

MODULE II: IS Foundations—This module covers analysis and decisions in three core information technology areas: processes, data, and security. Topics covered include business requirements analysis, system development methodologies, business intelligence, and new system implementation and transition management, uses of data, and information security and integrity.

MODULE III: IS Enterprise and Global Challenges—This module covers those aspects of Information Systems that will prepare managers to innovate and identify opportunities to gain market share in the face of global challenges. Key areas of focus include understanding emerging technologies and trends and the impact they have on organizations, coming to terms with how the digital economy has "flattened" the world, and changed the way we as human beings interact with one another; and understanding the critical success factors of enterprise systems implementation.

MODULE IV: Global Topics in Information Systems—This module puts the material learned and the experience gained in the preceding three modules into a global perspective. Through visits of IT operations and educational programs in a foreign country, students can compare their own professional experiences, as well as the topics covered in lectures and class discussions, with those in another setting. [4,5]

Findings:

Round One: Allocation of competency areas

The new MIS curriculum model proposed four areas of competencies for Master of Science in Information Systems degrees are as follows:

1. Individual Foundational,
2. Computing,
3. IS Management, and
4. Domain.

Members on the VCU IS Community in attendance went through four rounds and then voted to determine the best allocation of time spent in these areas in both the Executive and Evening MS Information Systems programs. The results are as follows:

All Members (Academic, Alumni, Industry)

Executive				Percentage of Time Spent	Evening			
All	**Industry**	**Alumni**	**Academic**		**All**	**Industry**	**Alumni**	**Academic**
19	17	16	23	**Computing**	32	31	29	35
36	35	38	37	**IS Management**	24	27	23	22
29	34	29	27	**Foundational**	29	28	33	30
15	15	17	14	**Domain**	15	14	18	13

Round Two: Allocation of categories within competencies

The updated MIS curriculum model also outlined categories within each of the competency areas. It was decided that the Domain competency would not be discussed and voted on since the results of round one determined that the three other categories were more important. The results of the three rounds to discuss the categories within the Computing, IS Management, and Foundational categories are below:

Individual Foundational Competencies

Executive Average	Categories	Evening Average
9	Analytical & Critical Thinking	13
10	Creativity	9
10	Collaboration	10
10	Ethical Analysis	7
6	Mathematical Competencies	9
16	Leadership	11
10	Negotiation	8
11	Oral Communication	10
8	Problem Solving	11
8	Written Communication	9
18	Other:	12

Computing Competencies

Executive Average	Categories	Evening Average
16	Business Continuity & Information Assurance	14
25	Data, Information & Content Management	25
19	Enterprise Architecture	19
13	IT Infrastructure	14
18	Systems Development & Deployment	18
26	Other: Emerging Technology, Mobile cloud, SOLOM	27

IS Management Competencies

Executive Average	Categories	Evening Average
25	Ethics, Impacts & Sustainability	27
28	Innovation, Organizational Change & Entrepreneurship	24
24	IS Management & Operations	27
23	IS Strategy	22

Round Three: Recommendations for how to implement

The last round consisted of discussions about observations and recommendations related to "how" the program is delivered. There were four categories that we asked for input from meeting attendees: Making it Real, Co-Curricular, Evaluation, and Content Delivery. The descriptions and comments from the third round are below:

- **Making it Real:**
  What types of projects should the students do? What about consulting? What services could the students provide?

  - Smaller teams
  - 360 evaluations
  - Creative team composition
  - Self case study
  - Real work examples
  - Feasibility of consulting projects
  - Update content (cloud, etc.)

- Mid-level managers as instructors
- Presenters are closer in experience to student profile
- Meet them where they're at on projects
- Applying academic knowledge to business
- IT Project (evening)
- Cohort project
- More project management

- **Co-Curricular:**
  How much time/value should we place on mentoring, coaching, professional development/trips to conferences, networking, giving back/contributing to the community? How do we best do these things?

  - Alumni as mentors (to teams)
  - Attending conferences/professional organizations – report/briefing based on this
  - Coaching for evening students
  - Combined events for evening & executive students
  - Original innovative idea
  - Design thinking
  - Stretch IS Assessment project to entire duration of program
  - Role-playing across domain
  - Expand mentoring
    - Networking
  - Keep mentoring program

- **Evaluation:**
  How to grade (pass/fail, graders, inflation issues); using standardized assessments versus program specific evaluation protocols

  - Inconsistent standards
  - Eliminate coasting
  - Projects
    - Rubrics – consistency
  - Teachable moments
    - What did they learn
    - Explain why you received that grade of 'C'
  - Establish baseline & then measure improvement
  - Consistency across all "courses" and modules
  - Manage the workload expectations across the curriculum
  - Too many different instructors
  - Too many different graders
  - Pre-post evaluation measures
  - Grades reflect feedback
  - Continuity
  - Communicate expectations

- Exit interview
- Peer evaluations
- Constant feedback

- **Content Delivery:**
  What formats are recommended (face to face vs. online vs. hybrid and what %s); what pacing (calendar start/stop times, compressed time frame, etc.)

  - Executive program needs to be longer (2 years)
  - Situational based learning (real-world)
  - Continuity is lost
  - International trip is important
  - Not big on online
  - Spread out program more
  - Make program two years
  - Pre-recommended lectures, followed by class discussion
    - Select student to lead discussion
  - Project throughout the program (all the way)
  - More case studies – situational scenarios
  - Hybrid with forced participation
  - Multiple speakers or panels
  - Open trips to alumni
  - Mid-level managers as speakers (not only CIOs)
  - Smaller teams

In summary, the consensus allocation among the four competency areas for the two masters programs only differed in primary two areas (Computing and IS Management). The recommended allocation for the computing competency area in the executive program was 19% and in the evening program was 32%. The recommended allocation for IS Management had an opposite emphasis with the executive program at 36% and the evening program at 24%.

CONCLUSIONS:

One of the major objectives in conducting the Focus Group was to validate the IS department master's curriculum committee's internal assessment of the two programs' curriculum outcomes. Namely, the curriculum for executive MS in Information Systems would continue to emphasize IS management than computing competencies, and the curriculum for the evening MS in Information Systems would continue to emphasize more computing than IS management competencies. This indirect measure was a confirmation to maintain the present set of courses that emphasis technical content to support computing competencies in the evening MS in Information Systems, and maintain the orientation that emphasizes IS management in the executive program.

The evening MS in IS program is designed for those students who continue their undergraduate academic experience, concentrating on improving individual knowledge of specific IS skills, or competencies. This goal is consistent with the 2016 Model Curriculum in achieving competencies for applying skilled IS knowledge. The integrity of the executive MS in IS program was confirmed; recognizing that those participating were achieving curriculum outcomes that supported a greater IS management emphasis.

Whereas the IS department offers two MS in Information Systems programs, each presenting a different orientation, yet both meeting advanced specialized content that is learned through applying the knowledge acquired from these programs. The IS department conducts individual and program outcomes assessment each year. This annual assessment provides an internal measurement of curriculum outcome achievement. The Focus Group confirmed that the current curriculum approaches will prepare IS professionals for future business requirements.

REFERENCES:

[1] https://app.box.com/s/79a4tjpgboo1lfbw17tql7vvwxc5obox (2016 MSIS Model Curriculum)

[2] http://www.theworldcafe.com/key-concepts-resources/world-cafe-method/ (World Café methodology)

[3] http://business.vcu.edu/graduate-studies/ms-in-information-systems/ (Traditional-Evening Program)

[4] http://business.vcu.edu/graduate-studies/executive-ms-in-is---it-management/about-the-program/curriculum/ (Executive MSIS Program)

[5] http://business.vcu.edu/graduate-studies/executive-ms-in-is---it-management/ (Executive MSIS Program)

Appendix 1

Master of Science in Information Systems

2016 Model Curriculum Review Meeting Summary

June 10, 2016

Wrap-up session comments and 'write-ins' from those unable to attend the meeting:

- Please tell me that information security will somehow find its way into the very core of the program. Anything less is a serious disservice to your students.

- Risk, Risk, Risk – this ranges from InfoSec, Vendor risk, 3rd party risk, to reputational risk (and much more in the risk area). We are also looking for leaders that have good Risk acumen – who think in a risk-aware way.
- Regulatory consideration – many industries are under regulatory scrutiny that we've never seen before. Multiple Federal Regulatory bodies, state and local regulatory bodies (and they don't all agree). Much of our tech spending is going toward making sure we are complying to the changing regulatory environment.

- What is Working
  - The three legged stool is correct: Tech, Coaching/Leadership, and Mentoring.
  - Bringing in outside experts is good.
  - Amenities are excellent.
  - International trip is good.
- Ideas for Change
  - We need to identify the key skills and attributes that graduates need for the next 5-10 years like: Agile, Lean, AI, vendor management, customer experience, DevOps, etc. Add content here.
  - Consider configuring the programs as follows: operational concepts first, tactical concepts next, then strategic concepts. This is how business works. If so, what are the key learnings at each stage.
  - Add more technical content even if that means making it longer to achieve the degree or reduce other areas.
  - Consider having fewer session speakers to help drive consistency. Maybe each speaker should do a series of sessions.
  - Consider adding test/exams/quizzes. Same for graded assignments in all areas.
- More radical ideas
  - Create Programs like an. M.S in Architecture or Portfolio Management, Digital Strategy, or other key areas.
  - Maybe an M.S. in Leadership with a concentration in IT, etc. I think you might find high demand for that program.

- Business Finance: I think that the ability of any IT leader to be able to participate at the C-suite level and understand what is going on with the organization is critical. Of course, many IT folks shy away from financials, so I am glad the program has this covered. However, I have gotten some really negative feedback about the Harvard online finance/accounting course for students to complete. They said that they it is difficult to understand and that they have worked just to get through it. When asked, they said that they do not really retain anything at the end of it.
- Product Development: I know that there is a whole section about developing code, but what about actually understanding the development process for technology. With the IoT, it is becoming more of a B to C environment where technology leaders are going to have to understand that while IT is a critical component of the business, it is quickly becoming "the business" and that requires a different mindset from just rolling out code/functionality to production.
- Security: Many of the students are interested in getting into security as it is the fastest growing field of not only technology, but jobs in this country. That said, many of the students have expressed interest to me in immediately getting into the security field. As with the PMP that you offer, I think it would be beneficial to have the Certified Information Security Manager certification offered or at a minimum the Security+ certification.

- I would like to emphasize these imperatives:
    - Cloud
    - API's
    - Open Source
    - Design Thinking
    - Big Data
- I would stop and visits to data centers and focus on these items and their impact on organizations to reinvent themselves

Appendix 2

World Cafe Method

Drawing on seven integrated design principles, the World Café methodology is a simple, effective, and flexible format for hosting large group dialogue.
World Café can be modified to meet a wide variety of needs. Specifics of context, numbers, purpose, location, and other circumstances are factored into each event's unique invitation, design, and question choice, but the following five components comprise the basic model:

1) *Setting*: Create a "special" environment, most often modeled after a café, i.e. small round tables covered with a checkered or white linen tablecloth, butcher block paper, colored pens, a vase of flowers, and optional "talking stick" item. There should be four chairs at each table (optimally) – and no more than five.
2) *Welcome and Introduction*: The host begins with a warm welcome and an introduction to the World Café process, setting the context, sharing the Cafe Etiquette, and putting participants at ease.
3) *Small Group Rounds*: The process begins with the first of three or more twenty-minute rounds of conversation for the small group seated around a table. At the end of the twenty minutes, each member of the group moves to a different new table. They may or may not choose to leave one person as the "table host" for the next round, who welcomes the next group and briefly fills them in on what happened in the previous round.
4) *Questions*: each round is prefaced with a **question** specially crafted for the specific context and desired purpose of the World Café. The same questions can be used for more than one round, or they can be built upon each other to focus the conversation or guide its direction.
5) *Harvest*: After the small groups (and/or in between rounds, as needed), individuals are invited to share insights or other results from their conversations with the rest of the large group. These results are reflected visually in a variety of ways, most often using graphic recording in the front of the room.
The basic process is simple and simple to learn, but complexities and nuances of context, numbers, question crafting and purpose can make it optimal to bring in an experienced host to help. Should that be the case, professional consulting services and senior hosts are available through World Cafe Services and we would be happy to talk with you about your needs.
In addition, there are many resources available for new World Cafe hosts, including a free hosting tool kit, an online community of practice, and World Cafe Signature Learning Programs.

Appendix 3 Course/Learning Outcomes Map

MSIS Student Learning Outcomes							
Program Courses	Required or Elective	(1) An ability to communicate and network effectively within the profession and within organizations	(2) An ability to serve the profession by applying knowledge broadly	(3) An ability to maintain key technical expertise in order to sustain required levels of competitiveness	(4) An understanding of information technology as it applies to business contexts and the skill to apply this technology effectively in specific circumstances	(5) An ability to develop efficient and effective IS solutions using appropriate technologies that can deliver competitive advantages to organizations	(6) An ability to develop and incorporate changes in the planning and management of IS resources based onan increased understanding of the dynamic changes to the organization, IS, and global environment
INFO 610: Data Base Systems	R	1,2	1,2	1,2,3,A	1,2,3,A	1,2,3,A	1
INFO 611: Data Re-engineering	E	2	3	2	2	1	2
INFO 614: Data Mining	E	1	2	3	3	3	1
INFO 616: Data Warehousing	E	1	2	3	3	3	1
INFO 620 Data Communications	R	0	2	2	2,A	3,A	2,A
INFO 630: Systems Development	R	0	1	3,A	3,A	3,A	0
INFO 632: Business Processes Engineering	E	2	3	2	2	1	2
INFO 640: Information Systems Management	R	2	1	0	1	1	2,A
INFO 641: Strategic Information Systems Planning	E	1	1	2	2	3	1
INFO 642: Decision /support and Intelligent Systems	E	1,2	1	1,2	1,2	1,2	0
INFO 643: Information Technology Project Management	E	1,2	1,2	1	1,2	1	1,2
INFO 644: Principles of Computer and Inforamtion Security	E	1	2	2	3	3	1
INFO 646: Security Policy Formulation and Implementation	E	1	1	3	1	1	1
INFO 654: Systems Interface Design	E	0	1,2	1,2	1,2,3	1,2,3	0
INFO 658: Electronic Commerce	E	0	1,2	1,2	1,2,3	1,2,3	1
INFO 664: Information Systems for Business Intelligence	E	2	0	2	1,2	1,2	0
INOF 691: Topics in Information Systems	E	topic dependent	topic dependent	topic dependent	topic dependent	topic dependent	topic dependent
INFO 693: Field Project in Information Systems	E	topic dependent	topic dependent	topic dependent	topic dependent	topic dependent	topic dependent
INFO 697: Guided Study in Information Systems	E	topic dependent	topic dependent	topic dependent	topic dependent	topic dependent	topic dependent

0 - Does not teach this outcome.
1 - Introduces students to this outcome.
2 - Gives students opportunities to practice this outcome.
3 - Provides students opportunities to demonstrate mastery of this outcome.
A – Assessment of the outcome is embedded in the course.
E - Counts toward the degree but is an elective.
R - Required.

Impact of WeChat Use among Cancer Patients' Informal Caregivers: An Exploratory Intervention Study in China

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Abstract

The treatment for cancer increasingly requires patients' informal caregivers (ICGs) involved throughout the disease trajectory. This can cause a great deal of psychological burden to the lives of ICGs. Through a 10-week smart-phone based social media intervention program, this study investigates ICGs' usage patterns of social media and the impacts of such a program to ICGs' strain and self-efficacy levels.

Introduction

Cancer has long been one of China's major public health concerns. Around 4.292 million people were newly diagnosed with cancer and 2.814 million Chinese patients died from cancer in 2015(Chen et al., 2016). As a chronic condition, the treatment for cancer increasingly requires care provided at home (Kurtz, Given, Kurtz, & Given, 1994; Nijboer et al., 1998) and informal caregivers (ICGs) have become highly involved throughout the disease trajectory.

ICGs refer to family members or friends who provide unpaid informal care to the patient on a regular basis (Anderson, Linto, & Stewart-Wynne, 1995; Siefert, Williams, Dowd, Chappel-Aiken, & McCorkle, 2008). Informal caregiving can bring about a great deal of burden, creating psychological, occupational and economic impact on the lives of ICGs and the whole family (Grunfeld et al., 2004). Informal caregiving requires ICGs to devote a lot of effort, and is commonly regarded as a full-time job (Rabow, Hauser, & Adams, 2004). It is reported that elderly cancer patients undergoing treatment, on average, receive 10 hours of care from ICGs every week, which is approximately 3 hours more than their peers without cancer (Hayman et al., 2001). In addition, ICGs may be unprepared for taking on the new role without additional support, which adds to their psychological stress. The role transition can often pose a serious threat to ICGs' psychological well-being and quality of life (QoL) (Deniz & Inci, 2015; Nijboer, Triemstra, Tempelaar, Sanderman, & van den Bos, 1999). Studies find that the distress level of ICGs is comparable to or even higher than that of the patient cared by them(Braun, Mikulincer, Rydall, Walsh, & Rodin, 2007; Juarez, Ferrell, Uman, Podnos, & Wagman, 2008; Kitrungrote & Cohen, 2006), and the disparity of patient outcomes is partly due to the difference in relationships between ICGs and patients (e.g., spouse, parent), types of treatment, and distress factors (Cousins, Davies, Turnbull, & Playfer, 2002; Juarez et al., 2008). Furthermore, most ICGs report high levels of unmet needs, with the severity of unmet needs increasing as time passes (Butow et al., 2014; Malik, Gysels, & Higginson, 2013; Sklenarova et al., 2015). It appears that ICGs with high levels of distress and low levels of QoL tend to have

more unmet needs (Sklenarova et al., 2015).

To date, many different intervention programs targeting at ICGs' needs such as communication (Stehl et al., 2009), education and support (Sun et al., 2015) have been implemented. It is suggested that the combination of support and education is the most effective means according to the interventions' outcomes (Waldron, Janke, Bechtel, Ramirez, & Cohen, 2013). In the past intervention programs, participants usually had to attend sessions as planned (Livingston et al., 2014; Stehl et al., 2009; Sun et al., 2015) and overcome the barriers associated with transportation, time schedule, and physical condition (Han & Belcher, 2001). These constraints may contribute to the low retention rate commonly seen in these intervention programs (Waldron et al., 2013). As a new medium to deliver interventions, the Internet provides great convenience, availability, and accessibility (McKechnie, Barker, & Stott, 2014), making it much easier both for researchers to carry out the intervention, and for ICGs to participate in the program. Moreover, the prevalence of smartphones and mobile networks further strengthens the advantage of the Internet. This has created a great opportunity in carrying out more efficient and cost-effective interventions.

The technological platform for a smartphone-based ICGs intervention can be a website, a specialized healthcare mobile app, or a general social media mobile app. In general, the social media app is more suitable for offering social support through support groups and personal narratives sharing, and it can also act as a resource of useful information and education (Chou, Hunt, Folkers, & Augustson, 2011; Han & Belcher, 2001; McKechnie et al., 2014). In spite of the tremendous potential of applying social media mobile apps to deliver ICGs interventions, little research is conducted to design such interventions and evaluate the implementation outcomes. In the current study, we design and develop an ICGs intervention based on WeChat, the most popular social media mobile app in China, and examine the feasibility and effect of the intervention.

This study intends to answer the following two research questions: (1) What are the WeChat usage patterns of ICGs for cancer patients in China? (2) How are the usage patterns of WeChat related to ICGs' strain and self-efficacy levels? The answers to these questions have great implications for improving wellbeing of ICGs for cancer patients.

Method

Social Media App

We chose WeChat as the platform to deliver the ICG intervention. This choice was based on two considerations. First, according to a recent report (China Internet Network Information Center, 2016), by December 2015, the Internet penetration in China had hit 50.3 percent with more than 90.1 percent of people using mobile phones to access the Internet. There were 620 million mobile phone Internet users in China. The report also indicated WeChat, a social media tool developed for mobile platforms, has been adopted by most mobile Internet users. WeChat has become the number one platform chosen by organizations to conduct social media promotions (75%). According to Tencent (Tencent, Inc., 2015 & 2016), the amount of monthly active WeChat users reached 549 million in 2015 and increased to 762 million in the first quarter in 2016. Over 90 percent of smartphones in China have been covered by this social media app. WeChat is heavily used. About a

quarter of users open WeChat over 30 times and 55.2 percent of users open it more than 10 times each day.

Second, many functions are embedded in WeChat which can facilitate the delivery of interventions. WeChat supports ongoing group chatting sessions in which any participant can send texts, emoticons, photographs, and video clips. Moreover, WeChat serves as a social platform for users to publish and share multimedia content (news, photographs, articles, videos, etc.) with anybody included in their friendship circles.

Intervention

We developed an intervention for cancer patients' ICGs by using WeChat as the communication channel. The invention lasted for 10 weeks and included the following five major components: weekly discussion, daily tip, doctor support, informational support, and peer support.

First, ten weekly group discussions were held on WeChat. At the beginning of each week (Sunday), we provided a specific topic for the participants to discuss. The topics include weather (e.g., what should cancer patient ICGs pay attention to in winter), holiday (e.g., how can ICGs spend holidays with cancer patients), and diet (e.g., how to help patients develop healthy eating habit), or symptoms (e.g., how to manage pain). Second, a daily care tip was posted every day to help ICGs take care of cancer patients. A total of 70 tips were provided. Third, an oncology doctor in a major comprehensive hospital was an active member of the WeChat group and answered all questions ICGs asked. Fourth, a medical school student, who joined the WeChat group as a moderator, provided additional educational information and materials to the participants based on their requests. Finally, peer support was encouraged during the intervention. The participants could share any information related to caring for cancer patients, including experiences, skills, tips, news, feelings, etc.

Study design

We took a case study approach in this research. First, this research addresses a descriptive question (what kind of usage pattern and what are the impacts). Second, this study aims to get an in-depth and first-hand understanding of a particular situation that has not been examined before. According to Yin (2003), the case study is most appropriate to achieve such research goals.

We recruited 20 cancer patients' ICGs into a WeChat group called Red Ribbon. With the help of the oncology department of a large Chinese hospital, we identified 20 cancer patients and contacted their ICGs to invite them to participate in this study. After getting their consent, we added each ICG into the WeChat group. Each ICG was treated as a single case in our study, giving us 20 cases to investigate.

Data Collection

We collected a variety of data related to the 20 ICGs. As a triangulation strategy, multiple sources were used to cross validate data accuracy. We retrieved the medical records of the cancer patients and had them reviewed by their doctors. The following information was obtained: medical insurance status, cancer type, diagnosis date, cancer progress stage, and treatments received. We conducted two rounds of semi-structured interviews with the ICGs regarding their experiences of taking care of

the cancer patients. One was conducted before the WeChat intervention and the other was after the intervention. We also conducted two rounds of surveys to measure the ICGs' levels of strain and self-efficacy before and after the intervention using validated scales. Specifically, we used the Modified Caregiver Strain Index (MCSI) and the Caregiver General Self-efficacy (CGS). MCSI, a 13-question tool, is a more recent version of the Caregiver Strain Index (CSI, 1983). This measurement covers five major domains: financial, physical, psychological, social, and personal. It has been well accepted to be used to assess strain level of the individuals who have assumed the caregiving role. Participants sore 2 points for each "yes" and 1 point for each "sometimes" response. The higher the score, the higher level of strain (Travis et al. 2003; Thornton & Travis, 2003). We employed Lorig et al (2001)'s 6-item Caregiver General Self-efficacy (CGS) scale to evaluate ICGs' self-efficacy. This scale was created based on several self-efficacy scales from the chronic disease self-management literature. It covers common domain across many chronic diseases such as symptom control, rule function, emotional functioning and communicating with healthcare professionals.

ICGs' demographic data such as age, gender, marital status, employment status, relationship to the cancer patient, and household annual income were also collected. Most important, all conversations among the ICGs' communication records in the WeChat Red Ribbon group were collected.

Data Analysis and Results

Table 1 shows the demographic characteristics of the ICGs. Their average age was 34.8 (SD=5.99). Exactly half of them were female. Nineteen of them were married and one was divorced. Nineteen of them had a job and one was unemployed. The ICGs are mostly children of the cancer patients except one being the patient's spouse and being the patient's sibling. The ICGs' annual household income varied with more than half of them between RMB 100,001 and 200,000 (around US$15,000-30,000). Their average WeChat use experience was 2.8 years (SD=1.23).

Table 1. Demographic characteristics of the ICGs

Variable Name	*Value*
Age	*34.8 (SD = 5.99)*
Gender	
Female	*10*
Male	*10*
Marriage Status	
Married	*19*
Divorced	*1*
Employment	
Employed	*19*
Unemployed	*1*
Relationship with the patient	
Spouse	*1*
Children	*18*
Sibling	*1*
Household income (RMB)	

< 30,000	*1*
30,000 – 50,000	*3*
50,001 – 100,000	*11*
100,001 – 200,000	*5*
WeChat Years	*2.8 (SD = 1.23, min = 1, max = 5.1)*

We categorized the ICGs into three different groups based on an analysis of their WeChat communication behavior during the intervention period: the influencer group, the utilitarian group, and the spectator group.

Three ICGs (15%, all females) fall into the influencer group. The defining characteristics of the ICGs in this group are that they actively participated in weekly discussions, provided support to their peers, and asked questions to doctor and healthcare professionals. They took extra efforts in providing resources and support to their peers in the Red Ribbon.

One representative case in this group is a 36-year-old working mom who has two gastric carcinoma patients (her father and father-in-law) at home, and both of the two patients recovered quite well. She demonstrated tremendous leadership in Red Ribbon by cheering up other participants and sharing useful information. As she said,

"I always try to stay positive in my life no matter what happens. Things happen. Nobody can stop them. It's no use to complain. You have to be strong and figure out how to solve the problem."

She tutored peer ICGs how to encourage cancer patients to eat, shared special formula to ease cancer patients' constipation problem, sent greetings to peers during holidays, and assisted peers to keep a happy mood in their lives using her own life examples. Moreover, she led Red Ribbon group discussions on topics such as the use of Chinese Traditional Medicine for gastric cancer patients. She believed that Red Ribbon was a useful platform where useful knowledge was accessible and direct communication with healthcare professionals was facilitated. She also mentioned that Red Ribbon had helped her feel less stressful.

Three ICGs (15%, 2 females and one male) are in the utilitarian group. Participants in this group had a utilitarian purpose and mainly used Red Ribbon as a tool to access useful information sources. They read weekly discussions, daily tips, and posts by the doctor, the moderator, and other participants. They sometimes asked questions in Red Ribbon, yet they did not proactively make contributions to Red Ribbon by providing any information or resources.

A typical case in this group is a 30-year-old nurse, whose mother got end-stage colon carcinoma. She was good at making use of Red Ribbon group. Not only did she ask questions about how to relieve anesthesia after chemotherapy, but she also asked other group members to vote for her son in an activity. But she did not give any feedback after her question was answered by healthcare professionals.

A total of 14 ICGs (70%, 5 females and 9 male ICGs) are classified as spectators. Some of them read weekly discussions, tips, and other posts. Some of them had set 'do not disturb' function to the Red

Ribbon group. They remained silent in the group. They never asked any questions or provided any feedback to their peers.

A representing case in the spectator group is a working man whose father got intestinal cancer. Before joining the group, his father had already recovered a lot. He stated that he spent very little time on WeChat in daily life, and he seldom read healthcare tips in the Red Ribbon. He hoped that the Red Ribbon could provide more healthcare information in the future.

Another representing case in the spectator group is a 35-year-old working mother who had an intestinal cancer patient at home, diagnosed in 2013. When interviewed, she described the patient's health condition as not bad. Having been using WeChat for five years, she mainly used it for her job requirements. The intensive use of WeChat during work made her feel overwhelmed. She mainly focused on using WeChat to meet job needs. She paid little attention to other forums like Red Ribbon. Neither did she think that the Red Ribbon group had brought any benefit to her, nor did she expect any help from it in the future.

Proposition 1. Based on their usage patterns of WeChat, ICGs for cancer patients can be categorized as influencer, utilitarian, or spectator.

An inspection of the three user groups reveals an interesting pattern. All three ICGs in the influencer group and 2 out of 3 ICGs in the utilitarian group are female. This suggests that female ICGs tend to engage in heavier use of Red Ribbon than male ICGs. Women are more willing to share knowledge with others, engage in social exchange. A Meta-analysis of gender differences in ICGs reveals that there is no big difference between male and female in the use of informal support (Pinquart & Sorensen, 2006). But gender differences do exist in people's behaviors on social media platforms. Yue (2014) found that compared to males, females are more likely to regard WeChat as more capable than e-mail to promote interactivity, and have a greater tendency to use instant messaging service for the purpose of socialization (Yue, 2014). Such gender differences in use habit of social media platforms is consistent with our findings. In the one-to-one interview performed after the intervention, before which we tried to contact all 10 male ICGs and 10 female ICGs, we received replies from four male ICGs and eight female ICGs. Among these replies, one reply from male ICGs and six replies from female ICGs are regarded as meaningful. According to the only meaningful reply from male members, the man reported that he seldom used WeChat and would occasionally read messages from the Red Ribbon Group. When asked whether joining Red Ribbon Group had made a difference to his life, his answer was he simply had no idea. Meanwhile, of the six female ICGs who gave meaningful replies, two stated that they read healthcare tips every day; one would read all the tips and discussions as long as the new messages happened to be on the top of the message list; and other three ICGs reported that they seldom read Red Ribbon Group messages. ICGs who frequently pay attention to Red Ribbon Group all open WeChat very frequently (at least more than three times daily), but not vice versa. A female ICG also mentioned that she is mainly meant to seek psychological support rather than acquire healthcare knowledge when she participated in discussions in Red Ribbon Group.

Proposition 2: Female ICGs tend to use WeChat more heavily than male ICGs in terms of both

sharing and seeking information.

Since it takes a great deal of effort from ICGs to look after cancer patients, it is a common problem that ICGs experience high levels of strain (Grant et al., 2013; Phillips, Gallagher, Hunt, Der, & Carroll, 2009). Although we had a very small sample, we still quantitatively measured strain levels of ICGs by using MCSI before and after the intervention to explore how the intervention could affect strain. In the influencer group, all three ICGs' post-study strain scores decreased comparing with their pre-study strain scores. The strain scores dropped from 13, 22, and 17 at baseline to 6, 16, and 14 at post-intervention. Despite the low sample size ($n = 3$), a paired t-test still shows significant difference between pre and post scores (17.3 vs 12.0, $p < .05$).

In the utilitarian group, two ICGs' MCSI score decreased from 10 to 7, one from 13 to 9, while one increased from 13 to 15. The average strain dropped from 12.0 to 10.3, but the paired t-test showed that the difference is not statistically significant ($p = .46$). We examined the ICG whose strain level increased and found that her patient's cancer status had worsen dramatically during the study period, which largely contributed to her heightened strain level.

Among the 14 ICGs in the spectator group, the average strain showed an increase from 7.9 to 9.9, and the paired t-test showed that the difference is statistically significant ($p = .005$). This suggests that although their strain levels at baseline is low relative to the other two groups, their strain level went up without active participation into the WeChat intervention.

One of the most active ICGs in Red Ribbon Group reported that she felt happier after joining Red Ribbon Group, and according to our measurement, she indeed experienced the largest decrease in strain score (from 13 to 6) among all 20 ICGs. In addition, some ICGs agreed that the healthcare information provided by the group could more or less help reduce their strain level. These comments suggest that active participation in Red Ribbon Group possibly has an effect on the reduction of ICG's strain level, though the strain level can also be affected by a myriad of factors not controlled in this study, such as the stage of cancer and the patients' personal traits.

Proposition 3: WeChat delivered intervention could reduce ICG's strain level.

For the three ICGs in the influencer group, all of their self-efficacy levels increased from baseline to post-study. The average self-efficacy grew from 6.2 to 7.3, but the difference is not significant ($p = .12$). For the three ICGs in the utilitarian group, the average self-efficacy level increased from 6.2 to 7.9, and the difference is not significant either ($p = .22$). For the spectator group, 10 ICGs' self-efficacy increased while 4 ICGs' self-efficacy decreased. Overall, the average efficacy level increased from 6.8 to 7.8, and the difference is almost statistically significant ($p = .06$).

It was often mentioned in the interview that the intervention had enabled them to be more capable of taking care of the patients, in that it added to their knowledge on healthcare as well as their ability to make psychological self-adjustment. Taken together with the feedback from the ICGs interviewed and data analysis, this suggests that WeChat delivered intervention can enhance ICG's self-efficacy.

Proposition 4: WeChat delivered intervention could enhance ICG's self-efficacy.

Discussion

This is probably one of the first exploratory studies to examine how WeChat delivered interventions influence ICGs in China.

First, to the best of our knowledge, no similar research has paid attention to the role social media platforms such as WeChat may take in delivering interventions to ICGs in China. But as the amount of WeChat users has become quite large and still keeps increasing, WeChat is a promising social media platform on which interventions can be delivered. However, the innovative intervention methods will likely lead to changes in behavior patterns of ICGs and performers of the intervention, and thus requires some new intervention strategies in order to achieve satisfactory intervention outcomes.

The use of social media is still at the early stage. The majority of ICGs in the Red Ribbon group are spectators. We need to set up strategies to motivate ICGs to participate in the health promotion. There are many reasons limit their social media forum use. For example, their use habit, their workload etc.

Second, ICGs are not making full use of support services. Mosher et al (2013)'s research reveals that among distressed ICGs, the usage rate of support services is rather low (Mosher et al., 2013). Similar problems are also reflected by this study. The number of spectators are significantly larger than that of influencers and utilitarian, and about half of ICGs interviewed stated that they paid attention to Red Ribbon Group at a low frequency. This may be partly because ICGs are busy in general and lacks either time or energy to read messages from their smartphones often, as was once mentioned by a female ICG in the interview.

Third, females tend to be more involved in social media forum. According to Pew Research Center (Duggan, 2013), historically, women were significantly more likely than men to use social media. This study demonstrates that female ICGs have deeper engagement with the WeChat forum than male ICGs. Many ICGs are female, which makes WeChat a good platform to educate ICGs. Finally, preliminary results indicate proper use of WeChat can help decrease ICGs' strain level, while increase their self-efficacy level. But as the Red Ribbon Group provide ICGs with both educational intervention and psychological support intervention, it is difficult to decide which one is more effective. Ideally future researches should perform different kinds of interventions respectively in corresponding groups.

A few ICGs indicated that the amount of information in social media made them sometimes feel overwhelmed. This calls for customized intervention in the future to meet ICGs individual needs to reduce information overload in social media.

Conclusion

One of the first attempts to provide support to ICGs using social media tools. This study identified three different groups of social media users: influencer group, utilization group, and spectator group. This study also shows that the level of social media forum use is negatively associated with their strain level, while positively associated with their self-efficacy level. The findings suggest that WeChat is a promising social media mobile platform that can be employed to deliver behavioral interventions to ICGs.

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IMPROVING THE INVENTORY POLICY OF A LOCAL BUSINESS IN NORTH CAROLINA

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This study is based on an inventory problem of a local sauce distributor, which is based in North Carolina and having high costs due to excess inventory, high inventory turnaround time, inaccurate forecasts, and small production lot sizes. As in every business, the proper utilization of inventory with maximum service level have been unattainable success factors for this local company as well. It is important to ensure that inventory is effectively being used and, particularly with perishable items, products are not being wasted. Our objective is to provide quick solution that will help the management accurately process orders and anticipate the amount of sales per month to be able to best handle the demand. We reviewed four years of historical sales and inventory data, analyzed the trends, and developed forecasts with the goal to advise the client on best practices for inventory planning going forward. We developed a new inventory policy to reduce total costs and inventory stock keeping time. After implementing the results, the management was able to see a quantified analysis of the shortcomings in their current forecasting method and gained good insights through the information analyzed to understand the shortcomings in their current inventory policy. They adapted the seasonality with trend forecasting model for future sales of all their flavors. The biggest economic benefit for the company was the insight the management has gained regarding the impact of business analytics.

INCLUDING ACTIVITY-BASED COSTING CONSTRUCTS IN A SURVEY OF ACCOUNTING COURSE – A BASIC ANALYSIS

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INTRODUCTION

Activity-based costing (ABC) is currently a widely-used multiple-based costing method that students will likely encounter in the workplace. Coverage of a detailed, broad-based analysis of ABC, while very desirable, is likely not possible for students taking a survey of accounting course (often taken by non-business majors) due to the ever-competing plethora of topics deemed essential in the business curriculum. However, including at least a brief discussion of the theoretical determinants of ABC in the survey course, as well as a basic analysis of the workings of ABC is essential since accurately determining the cost of a product is often basic to the successful operation of a business. In the sections that follow, an overview of costing a product is first presented, followed by an illustration of the use of ABC.

THEORETICAL DETERMINANTS OF ACTIVITY-BASED COSTING

The three costs generally associated with manufacturing a product are direct materials (DM), direct labor (DL), and manufacturing overhead (OH). The most contrary of these three is OH since it contains a fixed cost element, which means that the current portion applicable to a product must be derived from estimates about the future and, only in hindsight, will the precision of the estimates be known. Accordingly, OH in total (or only fixed OH if total OH can be split into its variable and fixed components) needs to be estimated for the time period under analysis – usually a fiscal year in the United States. To illustrate, suppose XYZ Company makes two products (a Gizmo and a Widget) and has determined the following costs:

		Gizmo		Widget
Direct Materials	6 pounds at $5 pound	$30 Unit	8 pounds at $5 pound	$40 Unit
Direct Labor	1 hour at $10 hour	$10 Unit	2 hours at $10 hour	$20 Unit

Total Overhead is estimated to be $600,000 for the fiscal year.

What happens next? Hopefully total overhead can be subdivided into its variable and fixed components. However, here in this basic analysis, assume that it will not be subdivided. The next step, then, is to determine a pattern to methodically allocate (or assign or apply) overhead to the products. To do this, the following allocation fraction is developed:

$$\frac{\text{Estimated Total Overhead}}{\text{Estimated Total Base}} = \frac{\$600{,}000}{\text{Estimated Total Base}} = \text{Total Overhead Rate}$$

The base of the fraction is where the theoretical determinants of ABC begin. Non-ABC (sometimes called traditional costing) generally uses a single base (or cost driver). Often the choice is one of the following: direct labor hours, direct labor dollars (also called direct labor costs), machine hours, or units. Suppose XYZ Company uses non-ABC and chooses direct labor hours for a base and estimates that Gizmos and Widgets will use 20,000 and 5,000 direct labor hours, respectively. The overhead rate will be,

Estimated Total Overhead / Estimated Total Base	=	$600,000 / 25,000 Direct Labor Hours	=	Total Overhead Rate of $24 per Direct Labor Hour

Overhead will then be assigned and the total manufacturing cost of the products will then be determined as follows:

	Gizmo	Widget
Direct Materials ……..	$ 30 Unit	$ 40 Unit
Direct Labor ……	$ 10 Unit	$ 20 Unit
Total Overhead:		
Gizmo = 1 Direct Labor Hour x $24 =	$ 24 Unit	
Widget = 2 Direct Labor Hours x $24 =		$ 48 Unit
Totals	$ 64 Unit	$108 Unit

Activity-based costing does not pick one base, but begins by analyzing all the activities in the respective departments involved in making the products. The focus is on determining which activities are used by which products – and even determining if perhaps some activities actually do not benefit any product, or if the benefits are so minimal that the activity (and the cost of the activity) can be eliminated. Accordingly, ABC is not just a mathematical extension of non-ABC, but an entirely different focus on costing the product. The theoretical basis for ABC is founded in a desire to more accurately align the costs of manufacturing with the products manufactured. Accordingly, a thorough analysis of the flow of the products should identify the activities. Next, the costs of the activities must be determined (preferably, a determination of whether an activity is a variable, fixed, or mixed cost activity can also be done, with the mixed cost activities then being divided into their variable and fixed components). Once the activities and costs have been determined, the rate per unit of activity can be calculated and the product costs determined. Suppose XYZ Company has identified three activities: Machining, Assembly, and Inspection. The product costs can be determined as follows:

Step 1: Identify the activities.

Step 2: Identify the bases or cost drivers.

Step 3: Compute the rate per activity.

Step 4: Assign the overhead to the products.

These four steps for both non-ABC and ABC are shown as follows:

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NON-ACTIVITY-BASED COSTING										
Step 1		Step 2			Step 3		Step 4			
Identify Activities	Estimated Cost	Identify Cost Drivers			Compute Rate Per Cost Driver		Assign Overhead To Products			
			GIZMO	WIDGET			GIZMO		WIDGET	
N/A	$600,000	Direct Labor Hours	20,000	5,000	$24 per Direct Labor Hour		PER UNIT = 1 Direct Labor Hour x $24 =		PER UNIT = 2 Direct Labor Hours x $24 =	
							OH	$24	OH	$48
							DM	$30	DM	$40
							DL	$10	DL	$20
							TOTAL	$64	TOTAL	$108

ACTIVITY-BASED COSTING										
Step 1		Step 2			Step 3		Step 4			
Identify Activities	Estimated Cost	Identify Cost Drivers			Compute Rate Per Cost Driver		Assign Overhead To Products			
			GIZMO	WIDGET			GIZMO		WIDGET	
Machining	$300,000	Machine Hours	20,000	30,000	$6 per Machine Hour		20,000 x $6 =	$120,000	30,000 x $6 =	$180,000
Assembly	$200,000	Direct Labor Hours	20,000	5,000	$8 per Direct Labor Hour		20,000 x $8 =	$160,000	5,000 x $8 =	$40,000
Inspections	$100,000	Number of Inspections	1,000	1,500	$40 per Inspection		1,000 x $40 =	$40,000	1,500 x $40 =	$60,000
							TOTALS	$320,000		$280,000
								÷ 20,000 =		÷ 2,500 =
							OH	$16	OH	$112
							DM	$30	DM	$40
							DL	$10	DL	$20
							TOTAL	$56	TOTAL	$172

ANALYZING NON-ABC VERSUS ABC RESULTS

Note that under Non-ABC the manufacturing cost of a Gizmo is $64 whereas under ABC it is $56. The Widget has a Non-ABC manufacturing cost of $108 and an ABC cost of $172. Which costs are correct? The answer, of course, is that both the non-ABC and ABC costs are correct. The question is – Which costs are better? Assuming that the activities are accurately identified and the costs are estimated within normal parameters, the ABC costs should be the more accurate costs for reflecting the use of resources in manufacturing the products. However, if the activities are just "sort of" identified, and the costs just rough "guesstimates," then ABC may provide little additional clarity for the product costs. Accordingly, implementing ABC should be done with a detailed focus on capturing the benefits available from ABC. Also note that the numbers used in the example in this paper are "textbook" numbers where everything easily adds up and equals. In practice, the total OH amount of $600,000 under non-ABC would likely not be the total OH amount under ABC. First, ABC should likely identify some activities that can be eliminated, along with their costs, to consequently reduce the total OH below $600,000. Also, implementing ABC can be expensive, which could drive the total OH cost up, perhaps above $600,000.

Another question sometimes arises concerning the changes in value. For example, suppose after implementing ABC the cost of a Gizmo is still somewhere near the old cost of $64 and Widgets still have a cost somewhere near the old cost of $108 – would the implementation of ABC have been fruitless? The answer is, of course, No, since the objective of ABC is not to give drastically different costs – Rather, the objective is to give more accurate costs. Accordingly, even if product costs differ little under the two methods, ABC usually details a more accurate mapping of activities to the products, which should provide valuable insight needed for production decisions in the future.

SUMMARY AND CONCLUSIONS

This paper presented an overview of the theoretical determinants of ABC along with a brief example of both non-ABC and ABC product costing techniques. Including at least a basic analysis of ABC similar to the one presented in this paper in a survey of accounting course for non-business majors should ensure that the students are better prepared for making a very important business decision – determining the cost of a product.

Influence of graph presentation format on user's decision making behavior

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Graphs provide rich pattern information that are generally more understandable than tabular forms. However, individuals can be often misled by distorted graphs (e.g., Pennington and Tuttle 2009), and there are many forms of distortion. For example, the Y axis of a graph does not begin from 0 or adding depth shading to make 2 dimensional (2D) graphs to look like 3 dimensional (3D) ones. We call the latter form of distortion pseudo 3D (P3D) graphs, which has 3D effect on 2D graphs. That is, the data set for the graph is 2D in nature, and P3D graphs, therefore, do not carry any more information than their 2D counterparts. P3D graphs can affect users' perception often in a negative way and, therefore, are not generally recommended (e.g., Tufte, 2001). However, the use of such graphs is prevalent in schools, advertisement, business, Web, and so on. This can be attributed partly to the ease of producing such graphs in one of the most popular graphing software—Microsoft Excel (Su, 2008). Past studies found the poor user performance of P3D graphs (e.g., Carswell, Frankenberger & Bernhard, 1991; Tversky & Schiano, 1998). Kelton et al. (2010) suggest multiple representations (e.g., graphs and tables) to mitigate the negative effects of distorted graphs, such as P3D graphs. In this paper, we study the decision making behaviors of subjects when they are given P3D graphs vs. 2D graphs in experiments. In the first experiment, we test if subjects using P3D graphs are to interpret the underlying pattern differently from those using 2D graphs. In the second experiment, subjects can purchase additional information, which is a table of the data used to draw the graph. We test if subjects in the P3D group is more likely to purchase the second piece of the information than those in the 2D group. A subject will go through multiple iterations of the same task with different data in each time. Along with their responses, we measure the speed of their responses in the experiments. In both experiments, we design the task that prefers graphs to tables according to the cognitive fit theory (Vessey, 1991). Students in regional universities in the southeastern US will be participants of the experiments that will be performed in computer labs. An important implication is whether or not the use of pseudo 3D graphs is justified, especially when people may prefer P3D graphs if they try to impress others (Tractinsky & Meyer, 1999).

INFORMATION SYSTEMS UNDERGRADUATE CURRICULUM:

A STUDY IN SELF-ASSESSMENT FOR PROGRAM VIABILITY

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ABSTRACT:

The purpose of this research is to report the results of a self-evaluation study conducted by the Department of Information Systems; School of Business, Virginia Commonwealth University (VCU) to assess the relevancy of its undergraduate curriculum relative to the current state of IS field and competitiveness among its peers as defined by the AACSB and ABET accrediting organizations. The methodology used in this study is based on the methodology employed in a study of the department's masters in information systems program and reported at the Southern Association for Information Systems Conference in the spring of 2016. Specifically, the study's methodology followed the following dimensions:

· The data collected and analyzed included comparable, competitive, and aspirant programs' undergraduate curriculum as identified by our current program accrediting bodies, AACSB and ABET.

· The compiled data from the comparable, competitive and aspirant programs, along with the VCU IS undergraduate program was mapped to the latest ACM/AIS Undergraduate Curriculum Model (2010).

· Identified trends in information technology and systems methodologies were used to

assess the impact on changes in curriculum content such that the curriculum would more accurately reflect the skill sets need to prepare students to become qualified entry-level IS professionals.

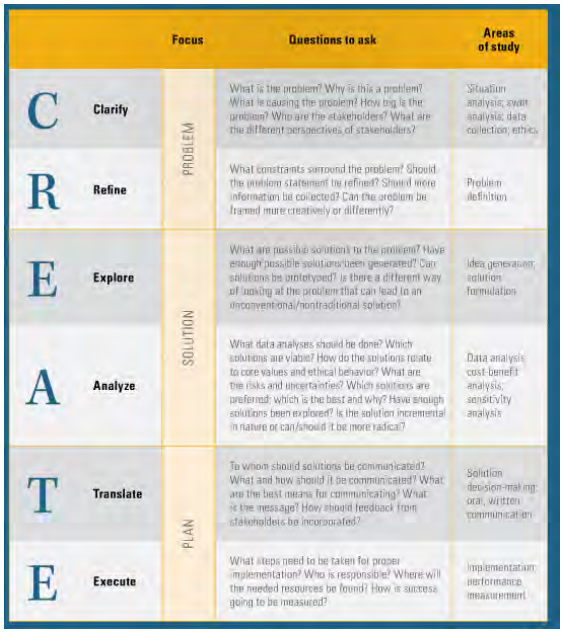
· Findings were presented at the IS Department's Undergraduate Curriculum Committee.

· Results from a Focus Group consisting of the current IS students, faculty, recent graduates, alumni who graduated within the past five years, and the local leading technical recruiters, was used to validate the results of the internal evaluation.

· A review and discussion of the study's findings at the 2017 SEDSI during the presentation session are to be included in the final report to the IS department and IS Advisory Board.

In addition to assessing the viability of the IS undergraduate curriculum, the study also provided an opportunity to examine the role the IS department plays in supporting the School of Business' strategic plan referred to as EPIC (Experiential Learning, Problem-solving Curricula, Impactful Research, and Creative Culture). EPIC introduces a new framework; CREATE (see Figure 1) for implementing the school's multiple curricula. This framework provides a problem-solving structure that students can take from the classroom into the business world. An operational guideline for how the department's undergraduate curriculum will support the new school's strategic plan through the CREATE framework will be presented. This extensive self-assessment initiative is designed to ensure the validity and applicability of the education provided by the department in the volatile IS field. A full report will be presented at the 2017 SEDSI Meeting.

Figure 1.



KEYWORDS: IS Model Curriculum, curriculum assessment, focus group.

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8. Focus Group: Summary Report

9. Curricula Mapping Tables

INVOLVEMENT OF PROFESSORS IN ACADEMIC PURSUITS IN RETIREMENT: A SYMPOSIUM

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ABSTRACT

The symposium addressed the "hows" and "whys" of academic and professional engagement of college and university professors in retirement. Perspectives of those recently retired as well as those approaching retirement were presented and discussed. The emphasis of the symposium was on audience participation and a guided discussion of the various issues and opportunities to be faced in remaining engaged in retirement. By such sharing of pursuits the participants gained ideas of activities which they might find of interest in retirement.

THE SYMPOSIUM

This symposium built upon a successful one at SEDSI 2016. A number of members of the SE Decision Sciences Institute (SEDSI) are approaching retirement in several years, and others have recently retired.

The panel consisted of several SEDSI members, representing the views of those planning retirement in the near future, and those who have already retired. Panel members gave brief opening statements of approximately seven to ten minutes, followed by participation and idea-sharing by the audience, facilitated by the panelists.

The general objectives of the panel were a sharing of personal ideas, plans, and experiences regarding retirement, seeking ideas about retirement activities that allow for retaining involvement in academia in some fashion, and for individuals to learn perspectives from others that they may not have considered. Additionally, participants may wish to build a community of support among themselves.

One example is that many of us have considered SEDSI a very important part of our academic careers in a number of ways. This has been more than strictly professional; the networking and friendship support system is very important as well. Are there meaningful ways to remain involved in SEDSI after retirement? What would these consist of?

Others may be ready to move on to other involvements and to leave academia behind. It would be of interest to learn from them what types of activities they contemplate that would provide meaning to their retirement years. Perhaps some want to be professionally vs. academically involved in their discipline, such as being a Baldrige examiner, applying their management skills to a non-profit or volunteer organization, etc.

There are a plethora of issues which can be addressed in panel discussions such as this. Among them are:

> What types of academic involvement can retired professors engage in? All three of the traditional faculty categories of teaching, research, and service are engaged in by some retired professors. For example, some may wish to stay involved in teaching by teaching courses as an adjunct. Others may continue streams of research in which they have been involved, perhaps with colleagues; or perhaps write books. Others provide volunteer service to their institutions, or to academic organizations such as the SE Decision Sciences Institute.

An Analogous Workshop

A somewhat analogous workshop entitled Mid-Career and Senior Consortium is conducted annually at the OBTC Conference for Management Educators [3]. The sessions explore the issues and challenges mid-career and senior faculty face in juggling multiple demands in the midst of a changing educational and academic environment. Sessions are oriented toward a conversation among the facilitators and audience. Among other topics frequently discussed are retirement decisions among the participants. Notable also is an emphasis in building a community of support.

Research Background

Fishman [2] conducted an in-depth study of 14 emeritus faculty members in 2009. They were engaged in a wide variety of academic and professional pursuits, including work in the areas of teaching, research, and service, as well as consulting. An interesting project planned by one upcoming retiree was to compile and maintain an up-to-date alumni contact list, a task for which the college's advancement office had difficulty doing because of other more immediate duties. However, this would allow her to work at her own pace and make a valuable contribution. Phased retirement programs, offered by many universities [2] are an attractive transitioning option for some.

Remaining active in some meaningful activity in retirement has been found by many to be important to the well-being of retired persons in general. For example, Buford [1] interviewed 100 high-profile persons (not just academics) who were engaged in a wide variety of pursuits in retirements. Many of these individuals related that their friends and colleagues who did not remain active often developed health problems, and even died prematurely!

Another question a faculty member needs to decide is *when* it's time to retire. In a roundtable discussion at a management teaching conference [3] facilitated by recently retired members of the organization the question was asked "How do I know when it's time to retire?" The response was "You'll know!" The implication being that a professor will have an intuitive sense of when it's time to move on to other pursuits.

In conclusion, given the tight-knit nature of SEDSI, the discussion was considered valuable, relevant, and enlightening for the participants. Closer relationships may be formed among members who are facing similar decisions and questions.

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Is China's Economy Impacted by the Dynamics of Oil Prices?

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Abstract

China is the second largest oil importer in the world as of 2015. How China's economy reacts to shocks in oil prices has been an important research topic. Existing literature shows that there are significant relationships between major China's macroeconomic indicators such as GDP, interest rate, export, and the shocks in oil prices. However, there is a void in the literature about whether these major macroeconomic measures in China would react to the shocks in oil prices homogenously or heterogeneously across the whole domain of the shocks in oil prices. Our study focuses on this topic. Specifically, we explore whether there are different impacts of oil price changes in the level and oil price volatility on China's major macroeconomic indicators such as GDP, export, household consumption, and government consumption. Using quarterly data and multivariate time series modeling framework, we estimate and test the significance of these impacts in different information regimes. The information variables in this study are oil price changes and oil price volatility. Furthermore, we employ impulse response analysis in each regime identified from the multivariate time series model to investigate the dynamics of the impacts of oil price changes and volatilities.

Keyword: China, Output, Export, Household Consumption, Government Consumption, Oil Price Changes, Oil Price Volatility, Multivariate Threshold VAR Model, Impulse Response Analysis

KNOWLEDGE SHARING, AN *IMPERATIVE* FOR SUCCESSFUL SUPPLY CHAIN COLLABORATION: AN EMPIRICAL ANALYSIS

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ABSTRACT

Supply chain collaboration is an emerging concept in a dyadic and extended network for generating the competitive advantage by participants; however, knowledge sharing among participants in the collaborative network is a significant parameter to achieve this strategic benefit. This paper is a systematic literature review on the significance of knowledge sharing in supply chain collaboration for B2B and B2C among dyadic and extended supply chain participants, published over a 10-year period from 2005 to 2016, and empirical analysis is performed to hypothesize the method for successful knowledge sharing in SCC based on nature of collaboration.

1. INTRODUCTION

The evolution of globalised dynamic markets with rapidly changing customer preferences is driving the firms participating in the supply chain to become more collaborative, agile and flexible for the successful implementation of supply chain processes in the business to business (B2B) and business to consumer (B2C) chain (Soosay and Hyland, 2015; Ince and Ozkan, 2015; Cao and Zhang, 2011; Simatupang and Sridharan, 2005). This is required in order to meet or exceed customer expectations. Supply Chain is defined in various literature as systemic, strategic coordination of traditional business functions (Almeida, Marins, Salgado, Santos, Silva, 2015; Mentzer, DeWitt and Keebler, 2001) fostered through strategic and management of material, information, and capital flows (Ince and Ozkan, 2015). With the advancement of supply chain practices, academicians and researchers have developed supply chain collaboration (SCC) as a key measure for generating the competitive advantage (Soosay and Hyland, 2015; Cao and Zhang, 2011; He, Ghobadian and Gallear, 2013; Singh and Power, 2009; Myers and Cheung, 2008; Kembro, Selviaridis and Näslund, 2014). Further studies have identified knowledge sharing as an imperative and keystone for successful supply chain collaboration among the supply chain participants in a buyer-customer dyadic relationship and to the extended supply chain network participants (Cao and Zhang, 2011; Myers and Cheung,2008; Kembro et al., 2014; Soosay and Hyland, 2015).

Supply chain collaboration is defined as two or more chain members working together to create a competitive advantage through sharing information, making joint decisions and sharing benefits which result from the greater profitability of satisfying end customer needs than acting alone (Soosay and Hyland, 2015). For purposes of this paper, SCC is defined as the integration of B2B and B2C processes within and between firms and organizations collaborating to achieve common desired results in the dimensions of inventory, forecasts, transportation and freight, demand planning, people, processes,

finances and technology. The collaborative supply chain participants can reap the benefits of integrated B2B and B2C processes in the supply chain only by constant information sharing and periodic syncing of data, as knowledge is recognized as an important source of competitive advantage (He et al., 2013).

Over the last decade, there has been increasing academic and practitioner interest in understanding and identifying the factors that contribute to effective knowledge transfer between supply chain actors (He et al., 2013). While technological suggestions such as electronic data interchange (EDI) (Ahmad and Ullah, 2013) and enterprise resource planning (ERP) (Ahmad and Ullah, 2013) to leverage knowledge sharing in SCC has been recommended by various literature reviews (Soosay and Hyland, 2015; Almeida et al, 2015; Simatupang and Sridharan, 2005; Cao et al., 2011; Kembro et al., 2014), there is no clear case study done on any firms ERP implemented system shared across all the B2B and B2C processes among supply chain participants. This raises further anticipation on the existence of any firm which has successfully implemented information sharing through ERP implementation for information sharing, across all participants in supply chain network. This research identified the elements of B2B and B2C process systems where information sharing is vital to maximize the competitive advantage of the supply chain participants, these include processes such as procurement, transportation, distribution, inventory management, product design, development and commercialization, manufacturing planning and flow management, order processing and fulfillment, customer relationship management, supplier relationship management, returns management and demand management (Ahmad and Ullah, 2013; Soosay and Hyland, 2015). Although the studies agree unanimously on the benefits of knowledge sharing across these business processes elements, various qualitative barriers such as trust (Ahmad and Ullah, 2013; Cai et al., 2013; Almeida et al,2015; He et al.,2013; Gold, Seuring and Beske, 2010) , mutual respect (Ahmad and Ullah, 2013), power asymmetry (Cai et al., 2013; Almeida et al, 2015; He et al., 2013) and other factors which will be detailed in this literature review, needs to be overcome by the supply chain participants in order to benefit from knowledge sharing in SCC.

The paper aims to review the literature and perform an empirical analysis on the factors that contribute to knowledge sharing among supply chain participants and deduce knowledge sharing as an imperative for successful SCC. The review is guided by following three research questions:

RQ1. What is the nature and extent of knowledge sharing in SCC?

RQ2. Does knowledge sharing in SCC benefit the supply chain participants?

RQ3. What are the key themes that need to be addressed for future research and implementation of successful knowledge sharing in supply chain collaboration?

The paper is organized as follows. Section 2 describes the research methodology and statistics and discusses the sample. Section 3 is the discussion on the main topic and addresses the research questions by discussing the dimensions of supply chain collaboration, empirical analysis of knowledge sharing in supply chain collaboration and barriers of knowledge sharing among supply chain participants. Section 4 describes the benefits of effective knowledge sharing across various supply chain processes identified in the study. Section 5 describes the future research opportunities and practical implementation of knowledge sharing in supply chain collaboration. Section 6 provides the conclusion on the literature review including the limitations of this study.

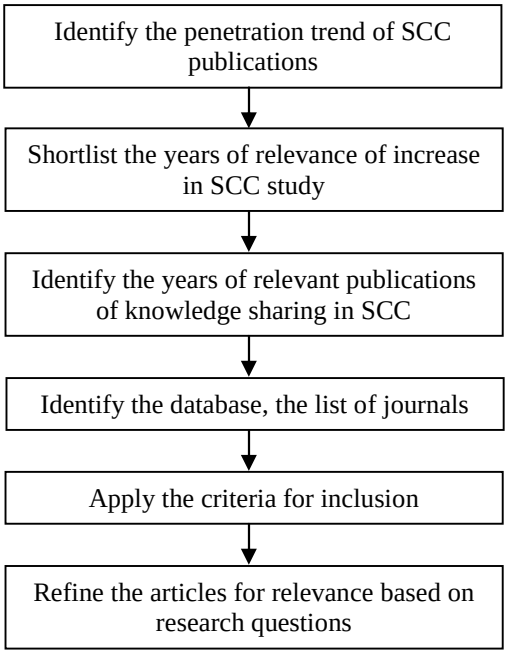
2. RESEARCH METHODOLOGY AND STATISTICS

Since knowledge or information sharing in SCC was the key focus area, it was significant for the review to understand the level of academician interest in SCC over the last decade. First, for the initial keyword search of *supply chain collaboration,* we could see there was an increasing trend on publications for the same topic since 2009 in various international journals. Second, to shortlist the time period of publications to be considered for the review, keyword search of *supply chain knowledge transfer* was done. It was found that majority of publications relevant in knowledge sharing in SCC were published within the last six years, subsequently, the articles for review inclusion were chosen from years 2005 – 2016. These years also ensure that this review includes academician recommendations for patterns of knowledge sharing, during the maturing years of supply chain collaboration, as well. Third, after identifying and establishing on the key concepts to be researched and relevant years to include in the study, keywords were shortlisted and articles were reviewed and researched for the relevant data to conclude the findings based on empirical analysis. The articles were also looked into to identify the impact of technology on knowledge sharing among supply chain partners and the utilisation of technology such as information technology systems for information sharing among supply chain participants. Fourth, to achieve the highest level of relevance, only articles published in English in leading supply chain international journals were considered which includes literature reviews, relevant case study, and research papers, where textbooks and book chapters were excluded.

Empirical research was done by performing a systematic literature review of publications, which overlapped in two criteria, first, the list in the initial search for relevant articles for this research and second, the list of publications that was repeatedly mentioned in other works of literature taken for this study. Accordingly, the publications included in research are *as listed here: Decision Sciences, The International Journal of Logistics Management, International Journal of Physical Distribution and Logistics Management, Journal of Business Logistics, Journal of Operations Management, and Journal of Supply Chain Management,* with the following keywords: *supply chain collaboration, supply chain literature review, supply chain knowledge transfer, supply chain collaboration antecedents, absorptive capacity, distributive capability, collaborative engagement, supply chain knowledge management collaboration* for the scholarly and practitioner articles in the years 2005-2016.

The scholarly papers and research studies were found using Google Scholar as a search engine, for its ease of use and providing the count of ‘Cited by’. The articles were further granulated with the focus of current state of supply chain collaboration, the role of knowledge sharing in supply chain collaboration to achieve the desired results of supply chain collaboration, the qualitative and quantitative factors affecting knowledge sharing among participants in supply chain collaboration, the benefits and hindrances of effective knowledge sharing in supply chain collaboration, techniques of how to execute effective SCC including knowledge sharing among the participants and the future scope of implementation and research.

TABLE 1: METHODOLOGY OF RESEARCH



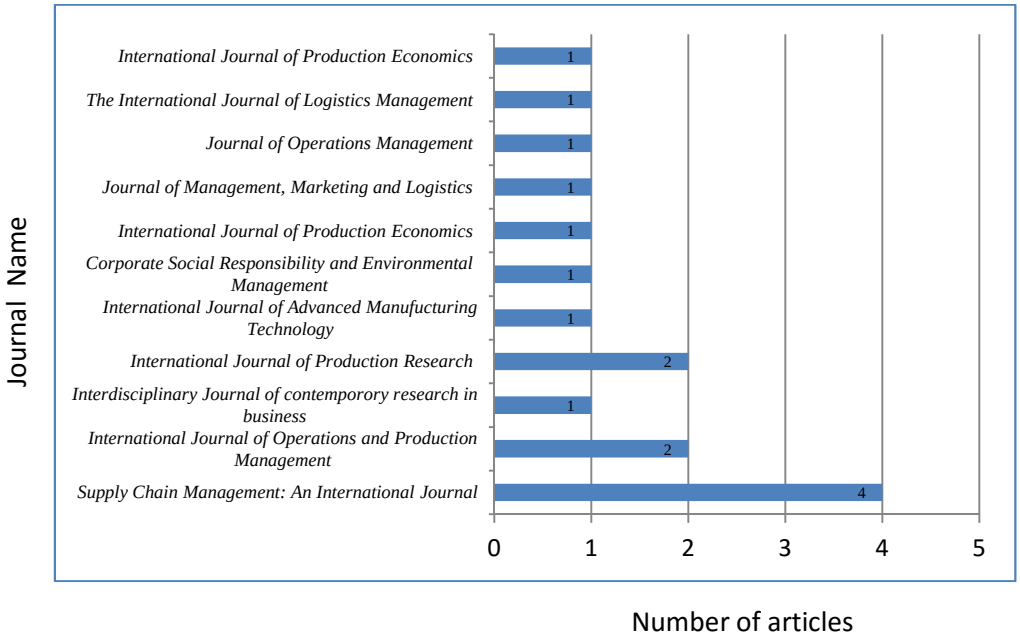
2.1 Search Results

A total of 11 literature reviews, 4 research papers and 1 case study was included in the scope of this review, after extensive search and refine on the relevance of published articles in the dimension of our research focus, nature and extent of knowledge sharing in SCC, benefits of knowledge sharing in SCC and the key themes for future research for implementation of knowledge sharing. Out of the many articles found in search results, only the articles 'cited by' at least 240 is taken into consideration and was further refined on the focus areas of qualitative parameters of knowledge sharing such as trust, power, collaborative symmetry etc., which is detailed in the paper and on the quantitative parameters of collaboration interdependency theories detailed in the review.

2.2 Data statistics

After considering a number of journals for relevant articles – literature reviews, case studies and research papers, on supply chain collaboration and knowledge sharing, we identified the most relevant articles from the below journals with the number of articles included in our review mapped in below table:

TABLE 2: NUMBER OF ARTICLES DISTRIBUTION IN JOURNALS INCLUDED IN THE STUDY:



3. DISCUSSION AND EMPIRICAL ANALYSIS OF KNOWLEDGE SHARING IN SCC

Soosay and Hyland, 2015 differentiates coordination with collaboration in supply chain as 'collaboration can be conceptualized as a strategy, a unique dynamic capability and the highest form of long-term, trust-based relationship. It is characterized by joint planning and decision-making regarding strategic and operational matters; resource, process, information and risk sharing and mutual understanding, working towards shared goals and achieving optimal solutions'. Knowledge sharing in supply chain helps the participants to share the risks, costs and generate competitive advantage for market share as the prevailing competition is largely characterized by time-based competition. The knowledge sharing related to supply chain often results in a speedier delivery of quality products or services, which increases market share, as well as lower overhead and inventory costs (Cao and Zhang, 2011). Furthermore, Cao and Zhang, 2011, identifies seven interconnecting elements in supply chain collaboration as information sharing, goal congruence, decision synchronization, incentive alignment, resource sharing, collaborative communication and joint knowledge creation. Knowledge sharing among supply-chain partners, as a key aspect of such partnerships, has been deduced to be critical to the performance of a collaborative supply-chain network (Ralston, 2014; He et al, 2013).The key decision criteria of a successful knowledge sharing between SCC participants is dependent on the knowledge transfer characteristics such as absorptive capacity, dispatching capacity and distributive capability (Whitehead et al., Forthcoming) along with other qualitative factors. Knowledge acquisition is the process of accessing and absorbing knowledge through direct or indirect contact or interaction with knowledge sources (He et al., 2013). Successful collaboration is dependent upon the abilities of each firm to the collaboration and, more specifically, each firm's specific knowledge absorptive and transfer capabilities (Whitehead et al., Forthcoming). An empirical analysis of the factors in knowledge sharing in SCC is discussed in the next section.

3.1 Impact of qualitative factors in knowledge sharing in SCC

Although supply chain participants in dyadic and extended frameworks appreciate having access to the relevant, quality, reliable information for effective performance and reduce wastage, the qualitative factors required for the successful knowledge collaboration and sharing are highly significant. Trust (Ahmad and Ullah, 2013; Cai et al., 2013; Almeida et al, 2015; He et al., 2013; Gold et al., 2010), mutual respect, information sharing (Almeida et al,2015), reduced privacy barriers, reliance on supply chain partners in providing accurate detailed and timely demand information (Ahmad and Ullah, 2013), synchronized communication (Almeida et al,2015), idiosyncratic resources (Cao and Zhang, 2011), dysfunctional silos in organizations (Soosay and Hyland, 2015), power (Cai et al., 2013; Almeida et al, 2015; He et al., 2013), commitment, shared values and a common vision of the future (Gold et al., 2010; Cai et al., 2013; Soosay and Hyland, 2015) comprise the qualitative factors that measure the nature and extent of effective knowledge sharing in supply chain collaboration.

Power is defined as the ability of one party (A) to get another party (B) to undertake an activity that B would not otherwise undertake (He et al., 2013). He et al., 2013 distinguishes between 'possessed power' and 'realized power' as 'realized power' is the outcome of exercising 'possessed power' to bring about intended changes in the behavior of the counterpart and balanced power exists where partnership actors possess broadly similar levels of power in influencing each other's decisions, while unbalanced power exists when one or more actors are able to manipulate decisions of the other actors. The power allocation among the supply chain participants is a key attribute to measure the nature of knowledge sharing, as some participants deem to be more powerful with access to key information and resources and less interdependency.

Trust among the participating members can overcome the disadvantages related to power disparity for knowledge sharing. Knowledge sharing between the buyer and the supplier requires that business practices, information, and technology know-how be shared (Cai et al., 2013), which requires substantial amount of trust and power distribution between the participants and defines the nature of the interdependent relationship. Trust in inter-organizational relationships is that it constitutes the essential element of organizational culture which is necessary for the individual to interact and share knowledge (Ahmad and Ullah, 2013). Trust may help to overcome obstacles in technical knowledge sharing and would increase a firm's willingness to share more technical knowledge as any potential risk of opportunism is reduced, and would make technical exchanges more efficient by reducing the time, effort, and financial cost in knowledge sharing (Cai et al., 2013). Trust grows over time and is embedded in the relationship itself. Trust cannot be traded on the marketplace and is very difficult to imitate by competitors (Gold et al.,2010). Two-way communication, facilitated by various forms of information technology and even extended to sensitive design information and crucial project and planning processes (Gold et al., 2010) may be assumed prerequisites of transferring and combining knowledge and hence initiating inter-organizational learning processes that may lead to the inter-firm competitive advantage.

Training improves the individual's knowledge on the SC system, while information sharing among participants in supply chain network in data level such as inventory levels, stock levels, etc. improves the performance of the SC system. As partners share and communicate with transparency and credibility, behavioral response due to improved trust, honesty, respect and commitment promote strategic collaboration, reducing the impact in SC network due to the volatility of supply and order disruptions (Almeida et al,2015). Collaboration through Information sharing and joint decision making among participants in a SC network improves the trust and behavioral responses to make the supply chain more stable.(Almeida et al,2015). From the literature reviews, it is observed that the qualitative factors that measure the nature and extent of effective knowledge sharing in supply chain collaboration are interdependent to leverage the supply chain collaboration. Supply chain collaboration is a "… business agreement between two or more companies at the same level in the supply chain or network in order to

allow greater ease of work and cooperation towards achieving a common objective" (Ahmad and Ullah, 2013). Successful SCC is when it is considered as a chain of B2B processes integrated with B2C processes. The sequential qualitative methodologies that can be used for knowledge sharing in SCC are (Kampstra, Ashayeri and Gattorna, 2006):

1. "Communication"- sharing of information through simple IT applications,
2. "Co- ordination"- intra and inter entity co-ordination of processes,
3. "Intensive Collaboration"- for improving the strategic decision making and enhancement of innovation in the supply chain,
4. "Partnerships"- sharing of investments and also profits.

In order to perform knowledge sharing in SCC, the participants need to identify the collaborative network defined as 'constituted by a variety of entities (e.g. organizations and people) that are largely autonomous, geographically distributed, and heterogeneous in terms of their: operating environment, culture, social capital, and goals' (Camarinha-Matos and Afsarmanesh, 2005) of SCC if in a dyadic/extended participant's relationship between buyer-supplier in the B2B and buyer-supplier-customer in a B2B+B2C framework.

Hence it is posited that the nature of knowledge sharing in supply chain collaboration is defined by the quality of these identified qualitative factors and extent of knowledge sharing in supply chain collaboration extends from the dyadic buyer-supplier relationship to an extended network of all participants including the customer.

3.2 Measurable impact analysis of knowledge sharing in SCC for participants

The dominant competitive advantage of any business firm is having access to predictive/un-predictive information and data first handed and vital data/information being immediately accessible to all participants in the collaborative network in order to perform a quick responsive strategy. In order to maximize the benefit of information sharing in the supply chain network, it is critical to understand the concept of 'sender'/ 'source' and 'receiver'/ 'recipients' participating in the information sharing in a dyadic/ extended network of supply chain participants. *Sources* are defined as the organizations that have substantial specialized (rare, inimitable) commercial knowledge, based on expert knowledge and/or experience (Whitehead et al., Forthcoming). *Recipients* are those organizations that are intentionally looking for specialized knowledge for commercial application and they have an identified need that must be filled by the knowledge that is not available within their firm (Whitehead et al., Forthcoming). Once the sources and recipients (Whitehead et al., Forthcoming) acknowledges their mutual collaborative role in supply chain, as the information sharing process progresses, closeness increases between the receivers and the senders and finally the members become able to act on new information in a timely manner, helps in improving relationships through the integration of partners information system, decision systems and business processes leading to improved performance , increase in visibility and reduction in uncertainty (Ahmad and Ullah, 2013) which paves the way to achieve inter-organizational competitive advantage to be a key player in the industry.

The bull-whip effect (BWE) in supply chain network was studied by two of the authors covered in literature reviews, Almieda et al.,2015 and Kembro et al., 2015, who identify BWE as the amplification in demand order variability as it moves up the spectrum of supply chain network and 'Information distortion also leads to a behavioral cause of BWE which is related to stock suspicion, when companies request a surplus amount of orders due to being afraid of reaching an empty stock and lose customers' (Almieda et al., 2015). The review notes that 'information sharing through information integration and synchronized communication improves the demand forecasts performance, sharing information is essential to reduce the fluctuations in inventories replenishment to improve the performance of the SC' (Almieda et al.,2015).

The percentage of contribution to firm performance index, due to the act of knowledge sharing among collaborative partners would be impacted by distributive capability (DC) - The ability of a knowledge source to transfer commercially relevant knowledge to a known recipient in order to effectuate positive performance outcomes (Whitehead et al., Forthcoming), absorptive capacity (AC)- the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends (Whitehead et al., Forthcoming) and dispatching capacity - The ability of the firm to identify essential knowledge, prepare it for transfer and ensure that it is transferred in its entirety (Whitehead et al., Forthcoming). DC and AC are complementary requirements for knowledge transfer and their asymmetry leads to necessary behavioral changes by either the source or the recipient or both suffer reductions in knowledge transfer success and the recipient's level of AC is positively related to the level of engagement in collaborative initiatives and to the operational outcomes of collaborative initiatives (Whitehead et al., Forthcoming). The knowledge-based view (KBV) posits that the relative ability to acquire and develop knowledge is the key reason for variances in organizational performance making knowledge acquisition capability an essential contributor to the enhanced operation of supply chain partners with knowledge acquisition mechanisms in supply chains including joint problem solving, ongoing manual adjustment, supplier co-design and collocation (He et al.,2013)

Firms need to identify the breadth and scope of knowledge sharing, in the dimensions of tactical, strategic and operational, where tactical knowledge sharing include purchasing, operation scheduling and logistics (Ahmad and Ullah, 2013), quarterly forecasts, plans and trends, operational knowledge sharing include order information, demand or sales data stock levels (Kembro et al., 2014), and strategic knowledge sharing includes long- term corporate objectives, marketing and information of the customer (Ahmad and Ullah, 2013), one-year forecasts, sales promotion and marketing strategies(Mentzer et al., 2001) to enable effective planning of future purchases and growth within the alliance (Kembro et al., 2014).

Hence it is posited that knowledge sharing in supply chain collaboration benefits the business and the supply chain participants.

3.3 Method for knowledge sharing among SCC participants

Once the business advantage through knowledge sharing in the collaborative network (CN) is acknowledged by supply chain participants, for effective collaboration, it is critical to identify the organizational behavior and nature of participants. We have used the list of collated theories in the literature review by Soosay and Hyland, 2015, and grouped the decision factors of each of the theories from various authors and identified the B2B and B2C process collaboration needed in terms of interdependence theory in literature review by Kembro and Selviaridis, 2015. Kembro et al.,2015, in their paper of empirical study of demand-related information sharing in dyadic and extended supply chain has identified that 'supply chain participants adapt information sharing in a pooled, serial or reciprocal type of interdependence'. "Interdependence theory suggests that groups or units within an organization are interdependent because of their technological requirements"(Kembro et al., 2015) Three main types of interdependence are:

1. Pooled interdependence signifies two activities without direct links that share a common resource and together contribute to a system output: "each part renders a discrete contribution to the whole and each is supported by the whole" (Thompson, 1967, p. 54);
2. Serial interdependence exists through direct links between activities where the input of one part is directly dependent on output from another; and
3. Reciprocal interdependencies represent the mutual exchange of inputs and outputs with "each unit posing contingency for the other" (Thompson, 1967 p. 55).

SOURCE : Kembro et al.,2015

Myers and Cheung (2008) identified the types of knowledge sharing required in the supply chain.

1. Information sharing: takes place when companies exchange important data about sales, customer needs, market structures and demands.
2. Joint sense making: occurs when supply chain participants' work together to solve operational problems, analyze and discuss strategic issues and facilitate communication about the relationship.
3. Knowledge integration: occurs when supply chain partners develop relationship-specific memories, providing everyone with a common understanding of idiosyncratic routines and procedures governing the relationship.

Once the type of interdependency for each type of collaboration was identified, we mapped the type of knowledge sharing needed for supply chain participants aligned to the corresponding collaborative theory.

TABLE 3: MAPPING OF TYPE OF KNOWLEDGE SHARING FOR THE COLLABORATION THEORY:

Organizational theory for collaboration	***Decision factors***	***B2B/B2C process collaboration needed - pooled/serial/reciprocal***	***Method for knowledge sharing***
Resource-based theory ((Barney, 1991))	**:** collaborations are designed to enlarge the size of the joint benefits and give each member a share of a greater gain that could not be generated by each member alone **:** resources, including technologies could be utilized and exploited from supply chain partners or synergistically combined to derive competitive advantage **:** firms enter into resource based collaborative agreements to complement their resources **:** inter-organization collaboration facilitates the development of valuable resources	Reciprocal Interdependence	Knowledge Integration
Relational view(Dyer and Singh, 1998)	**:** idiosyncratic inter-firm linkages are an important source of competitive advantage and superior rent, as relational rents are the supernormal profits jointly created in a collaboration through the combined idiosyncratic assets, knowledge and capabilities of firms and such resources can be distributed across partners in the supply chain **:** four sources of relational rents: (a) relation-specific assets; (b) knowledge sharing routines; (c) complementary resources/capabilities; and (d) effective governance **:** The unit of analysis in the case of the relational view is networks and/or dyads of firms **:** Shared resources and routines are a source of competitive advantage	Pooled Interdependence	Knowledge Integration

Organizational theory for collaboration	***Decision factors***	***B2B/B2C process collaboration needed - pooled/serial/reciprocal***	***Method for knowledge sharing***
Resource advantage theory(Hunt and Davis's (2008)	**:** firms that bundle resources of greater effectiveness and/or lower cost relative to competitors due to heterogeneously distributed resources within markets achieve superior performance and to reduce uncertainty and interdependence **:** recognizes the significance of power	Pooled Interdependence	Joint sense making
Social exchange theory(Homans, 1958)	**:** incorporates social factors into relationships and explain how companies in exchange relationships in a supply network evaluate the outcomes of the collaboration against pre-conceived reward expectations **:** collaborative behaviors and information sharing comprising trust, commitment, reciprocity and power can affect the performance of supply chains as a whole.	Pooled Interdependence	Information sharing
Stakeholder theory (Freeman, 1984; Donaldson and Preston, 1995; Mitchell et al., 1997)	**:** used to identify the dynamics of interaction between an organization and its stakeholders, characterized by power, legitimacy and urgency	Pooled Interdependence	Information sharing
Signalling theory (Spence, 1973)	**:** supports the idea that potential signals (e.g. a firm's reputation, philanthropic actions or media announcements concerning strategic decisions) could positively or negatively affect buyer–supplier relationships	Pooled Interdependence	Information sharing
Force field theory (Lewin, 1951)	**:** proposes the need for managers to consider the driving forces - customer demand, aligned goals, shared customer-oriented vision, trust, supplier development and technological connectivity and resisting forces - lack of senior management support, inadequate technology, organizational culture and structure, people, policy and processes, opportunism, information and power asymmetries which serve as barriers to effective collaboration, when pursuing a collaboration capability.	Serial Interdependence	Information sharing

Organizational theory for collaboration	***Decision factors***	***B2B/B2C process collaboration needed - pooled/serial/reciprocal***	***Method for knowledge sharing***
Transaction cost theory (Williamson, 2008)	**:** explain supply chain collaboration in terms of the uncertainties, risks and opportunism in partners. **:** both demand uncertainty and environmental uncertainty & dependency affect the level of information shared with key suppliers, which in turn could have impacts on collaboration across the supply chain. **:** firms enter into collaborative agreements in order to reduce the cost of participating in the market and explains the governing mechanisms used by firms to prevent opportunistic behavior or uncertainty	Pooled interdependence	Knowledge integration
Contingency theory (Fielder, 1964)	**:** used to support collaborative planning initiatives in supply networks as there is no best way to organise, lead or make decisions, where the optimal course of action is dependent upon the internal and external situation.	Reciprocal Interdependence	Joint sense making
Agency theory (Jensen and Meckling, 1976; Eisenhardt, 1989)	**:** provides insights into how social, political, legal and behavioral dynamics affect supply chain relationships	Pooled Interdependence	Information sharing
Technology-Organization-Environment theory (Tornatzky and Fleischer, 1990)	**:** used in electronic collaboration studies to explain customer-supplier relationships and the adoption or diffusion of technology.	Serial Interdependence	Knowledge integration

Source references: Soosay et al, 2015; Richey et al., 2012; Gold et al., 2010, Murray et al., 2005; He et al.,2013; Zacharia et al. 2011

The resource-based theory focuses on supply chain partners, where collaboration is required for firms to complement their resources, facilitating synergistic development, to enlarge the join benefit and generate competitive advantage. Participants in such collaborative network pose reciprocal interdependency with mutual exchange of data through knowledge integration such as EDI to improve information processing and sharing information on automated technology implementations for mutual benefit to improve joint efficiency. (Kembro et al., 2015).

The relational view is relevant on a buyer-supplier network where, trust rather than opportunistic behavior, creates collaboration through combined idiosyncratic assets, knowledge of the firms, and resources are distributed across the partners as relational rents, jointly creating supernormal profits (Kembro et al., 2014; Soosay and Hyland, 2015). Pooled interdependence process collaboration among such partners in a relational view, with the knowledge integration method, for knowledge sharing of

idiosyncratic routine and procedures governing the relationship can complement the advantages generated by partners in relational view.

Resource advantage theory recognizes the importance of power among supply chain partners, and "highlights how firms that bundle resources of greater effectiveness and/or lower cost relative to competitors due to heterogeneously distributed resources within markets can achieve superior performance" (Soosay and Hyland, 2015). The collaboration interdependence among partners in such network is pooled interdependence, as activities may/may not have direct links that share a common resource, however each will be supported by the whole. Joint sense making type of knowledge sharing compliments the benefits generated by partners in similar network, where they analyze and discuss strategic issues and facilitate communication.

Social exchange theory is relevant on supply chain partners in CN, who incorporates social factors into relationships, leveraging positive collaborative behaviors such as trust, commitment, reciprocity and power to affect the performance of supply chain as a whole (Soosay and Hyland, 2015). The participants share a pooled interdependence in such a network with the knowledge sharing method of information sharing, where participants exchange information data about sales, customer needs, market structures and demands

Stakeholder theory focuses on the qualitative behavior of stakeholders, and signaling theory focuses on the idea that potential external participant-market signals/behavior could affect buyer-supplier relationship (Soosay and Hyland, 2015) and pooled interdependence with information sharing may be used in both collaborative network theory participants.

Force field theory focuses on "driving forces such as customer demand, aligned goals, shared customer-oriented vision, trust, supplier development and technological connectivity" (Soosay and Hyland, 2015), creating a serial interdependency among participants, where information sharing through electronic data exchange can be the knowledge sharing method.

In the collaborative network where market situations and economic transactions are driving factors, transaction cost theory can be relevant, as "it explain supply chain collaboration in terms of the uncertainties, risks and opportunism in partners" (Soosay and Hyland, 2015). The participants share a pooled interdependence in the network, where knowledge integration through electronic data integration could compliment the collaborative advantages.

Contingency theory "supports that there is no best way to organise, lead or make decisions, where the optimal course of action is dependent upon the internal and external situation" (Soosay and Hyland, 2015). The partners share reciprocal interdependency where joint decision making could support the collaborative network.

Supply chain participants exhibiting agency theory attributes, could benefit from information sharing as they share a pooled interdependence. Participants in technology-organization-environment theory share serial interdependence, where partners share direct links on input provided from each other to generate output, and knowledge integration would add significant value for supply chain players.

Although we could conclude theoretically the type of knowledge sharing needed for the identified collaboration theories, a challenge exists on the quality of implementation of the same due to asymptotic idiosyncratic behavior of supply chain participants or opportunistic behavior among any participants in dyadic or extended collaborative network (CN). The barriers for knowledge sharing in pooled interdependence are demand information disaggregation; risk of demand information misinterpretation; and risk of making production and distribution decisions based on incomplete information. (Kembro et

al., 2015). Similarly, the quality of information shared which is determined by accuracy, timeliness, credibility and proper formatting of data plays a significant role in the information sharing process (Ahmad and Ullah, 2013). In knowledge integration type of information sharing, if a central ERP system or information technology systems are practiced by supply chain participants, it is imperative to ensure that all participants are connected to the system and synced with common data, albeit the business buy-in for the cost sharing by participants could be challenging as the benefit-cost ratio might increase only at the later stage of implementation of the same.

Kembro et al., 2014 also captures a final barrier, related to power-dependence theory as 'power asymmetry…resistance to sharing information. A company may fear that they could become overly dependent or the dominant player does not wish to lose the current favorable position and bargaining power in a supplier–buyer relationship. Indeed, the relative power of buyers/suppliers to one another can influence the degree of (inter)dependencies in supply chains, considering whether market shares as percentage of total expenditure/sales are high or low, and also how buyers and suppliers are connected to each other and to the broader supply networks'

Further research is needed in the classified theories and mapping we have concluded from various literature reviews on how implementation of successful knowledge sharing can be performed in collaborative network (CN).

Hence it is posited that the above discussed structural and organizational barriers, identification of collaboration method needed for the supply chain participants and the knowledge sharing method required for the participants are the key themes that need to be addressed for future research and implementation of successful knowledge sharing in supply chain collaboration.

4. BENEFITS OF KNOWLEDGE SHARING IN SCC

From the literature review, it is found that most of the studies found the performance of firm improves by knowledge sharing among partners in supply chain collaboration and benefits include lower operating costs, higher productivity and improved planning of production for all supply chain partners (Kembro et al., 2015). The level of knowledge acquisition from its supply chain partners is positively related to the supply chain performance of a focal firm (He et al., 2013). Knowledge sharing in collaborative supply chain network would result in improving the performance of supply chain, increase in visibility and reduction in uncertainty, improved forecast, reduced inventory levels to more long term benefits like enhanced planning in SC.(Kembro et al., 2015, Ahmad and Ullah, 2013).

The reasons for the amplification of demand variation across the supply chain participants in supply chain is observed as distortions, lack of transparency, and information sharing such as historical level of end-user demand, schedule requests from businesses downstream in the SC and inventory information, also downstream in the SC (Almeida et al., 2015). The efficiency of the supply chain is related to the streamlined flow of information across the upstream and downstream participants in the CN could result in well-informed strategic decisions for the supply chain participants.(Kembro et al 2015).) From the reviews it is observed that information sharing by information integration, data exchange, and synchronized communication will improve the operational, tactical and strategic decision making among the supply chain network participants, further paving the way for the network participants to be key players in a dynamic market environment.

5. FUTURE RESEARCH AND PRACTICAL IMPLEMENTATION OF KNOWLEDGE SHARING IN SC

Simatupang and Sridharan (2005) in their study of 76 retail companies in New Zealand have found out that sharing of information significantly affected on-time delivery, accuracy, fill rate and inventory performance, while it had a moderate impact on lead time and flexibility. Another example of utilizing knowledge transfer for business profits is Toyota's production network, it comprised not only numerous procurement relationships but also a vast array of bilateral and multilateral knowledge-transfer routines (Cai et al.,2013). In IKEA, knowledge sharing is a culture, and the company trains its supplier network on new innovative methods for cost cutting in suppliers' processes and methodologies, in order to achieve the market driving strategy.

Knowledge management in upstream and downstream in SCC, is identified as an important mechanism to maintain competitive advantage during periods of rapid change due to innovation, technology, and disruption (Almeida et al,2015).With the revolution of robotics, artificial intelligence and drones as disruptive driving force for the future market, where robots and humans are predicted to work alongside or replace human workforce by 2020, as per the projection by World Economic Forum (The Global Risks Report 2016, WEF), and the current trend of customer preference of switching from retail stores to online purchasing with growing e-commerce, supply chain participants in the dyadic and extended network should not overlook the benefits that can be achieved by knowledge sharing among them through the interdependencies and theories discussed in this paper in order to achieve market growth advantage and to become indispensable players in a rapid technology intervened growth industry. Further research in the dimension of surveys, case studies of firms practicing mapped to each of the dependence theory in supply chain management is needed to establish the theories concluded based on literature review.

6. CONCLUSION

The literature review sought to explore the nature and extent of knowledge sharing in SCC, the benefit of knowledge sharing in SCC for participants and key theme that needs to be addressed for future research for implementation of knowledge sharing in SCC. The review has explored the subsequent steps required by the B2B and B2C collaborative supply chain participants, based on the organizational theory decision factors and hypothesized the method by which participants can share knowledge in order to leverage the competitive advantages generated by successful collaboration. Profit sharing among supply chain participants, implementation of ERP IT for information sharing and information integration, representation of leaders of participating supply chain actors in mutual leadership board for sharing the risks and benefits, improving the trust and power disparity etc. are the methods to implement and leverage the knowledge sharing among supply chain network firms.

Although the literature implies the significance of knowledge in leveraging the supply chain collaboration benefits, the source of knowledge and sharing of the same within B2B and B2C and extended participants is not thoroughly studied through current research. Future research on the concepts observed in this literature review can be performed in the dimension of the case study in practicing firms. This would help to measure and deduce the qualitative and quantitative factors, and proposed hypothesis implementation in a buyer-supplier dyadic relationship or cross-pollinated network of buyer-supplier and buyer-supplier-customer, in a more holistic approach to exploring this growing research area.

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LENGTH DISTRIBUTIONS AND DYNAMIC BUFFER SIZING IN MULTI-SERVER QUEUEING SYSTEMS

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Multi-server queueing models are common in several areas of operations research, including manufacturing systems, call centers, and computer networks. Many researchers have studied analytic approximations for multi-server queueing systems, particularly the estimation of average waiting times in systems with non-exponential service distributions [1]. However, simulation still remains the preferred technique for many problems involving multi-server queues, including problems of resource allocation in systems with finite storage buffers [2].

This talk presents new analytic approximation techniques for the queue length distributions in M/G/1 and M/G/c queues. The derivations are based on the fundamental laws of queuing systems and require only the first two moments of the service time distribution. Comparisons to simulation estimates show that both approximations are accurate for a range of practical systems, including those with high utilizations and high service time variability.

Multiple authors have used Little's Result to derive a relationship between the queue length and residual service times [3–5]. We first adapt these results to derive a two-moment approximation formula for the M/G/1 queue length distribution. This result has several desirable properties: it requires only the mean and variance of the service time distribution rather than the complete moment-generating function, it is exact for M/M/1 systems, and it can be used to recover the exact mean queue length.

Extending the single-server approximation to multi-server systems, we observe that, from the perspective of a customer waiting in line, waiting in an M/G/c queue is like waiting in an M/G/1 queue with service rate multiplied by a factor of c. Therefore, it is possible to derive an expression for the queue length in a multi-server system that has a form similar to the single-server approximation. Simulation experiments show that this approach is accurate for many practical systems, including queues with dozens of servers and high service time variability.

The conclusion of the talk features a presentation of new research in progress on dynamic buffer-resizing in systems of multi-server queues. Many systems are constrained by

a limited amount of storage that must be shared among a series of production centers. For example, in a job shop, there may be a limited amount of buffer space for work-in-progress that must be allocated among different production lines. Therefore, efficient techniques for reallocating buffer space in response to changes in load are of both practical and theoretical interest.

The key result of this section is the use of the multi-server queue length approximation to estimate the blocking probability for $M/G/c/b$ queues, drawing on heuristics developed by Tijms [6]. We will also discuss potential applications and open problems related to analytic buffer sizing models.

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Effective use of Software for Statistics Instruction

Session Chair: Bob Andrews, Virginia Commonwealth University

Presenters:
Julian Parris, JMP
Patrick Barbera, Pearson

Abstract: Presenters will demonstrate the use of their software to help students learn and engage with core concepts in statistics and data analysis ranging from introductory statistics to analytics procedures. MyStatLab software helps to manage and individualize the learning and evaluation process through several capabilities such as auto-graded Excel based exercises. JMP examples will include simulations to demonstrate foundational topics such as the sampling distribution of the mean and outlier influence to how interactivity of a visualization can illuminate the output of unsupervised machine learning algorithms for clustering, and how dynamic and responsive graphics can be used to teach core design principles in effective data visualization.

Managing Conflict When Your Workplace Does Not Have a Program.

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Clayton State University

Conflict in the workplace is inevitable. There are many potential causes for workplace conflict, including personality clashes, stress, and heavy workloads. Many people would even say that some conflict is good for change and growth. However, it can also lead to a variety of problems, not the least of which is employee dissatisfaction, and the desire to leave the company. Some believe that as the use of teams increases, the incidence of conflict will also increase. Research indicates that dysfunctional conflict can be costly. It results in time being wasted, lower productivity, absenteeism, and lower motivation.

Many companies have established programs to deal with conflict and these may include components such as a formal or ad hoc policy, a conflict management person, a committee or department, an ombudsperson, voluntary or mandatory policies on mediation and arbitration, grievance procedures, panels of internal or external neutrals, or a neutral fact-finder. However, some workplaces have no such program. The reasons for this involve a concern for the costs of developing and running a program, fear of causing conflict to escalate, too much attention focused on minor problems, and suspicion about these programs on the part of the employee and employer.

Even if no program exists, conflict probably does. An individual involved in conflict and looking for a solution must first ask him or herself several questions: Are you a manager or supervisor? Are you directly involved in the conflict or just impacted by it? If you are directly involved, with whom is the conflict, i.e., A co-worker or a supervisor? If you are not involved in the conflict, do you have the time and the skill to participate?

The answers to these questions will determine a course of action. This paper will suggest and discuss various techniques addressing those answers.

MAXIMIZING ASSET RECOVERY: ESTABLISHING A DISPOSITION DECISION TOOL

Kim Whitehead, Anderson University
Edmund Prater, University of Texas at Arlington

ABSTRACT

Driven by both internal and external pressures, organizations are becoming skilled in the art of reverse logistics. Some of these have adopted reverse logistics voluntarily while others are participating due to governmental pressures and financial risk. This paper contributes to the literature by focusing on the asset disposition decision step in reverse logistics. Efficient and effective disposition decisions are key both to recovering the maximum economic value from returned assets and insuring social responsibility. Addressing the need for management tools, this paper proposes asset recovery selection criteria and performance measures that can be used to evaluate and compare disposition options.

INTRODUCTION

Despite their aggressive efforts to produce and sell products into their respective market channels, most organizations eventually become relegated to be passive recipients of those same products as they are returned through the reverse supply chain (Guide Jr. et al., 2003). This phenomenon is increasingly worrisome as the volume of products flowing through the reverse supply chain now exceeds $100 billion worth of products per annum in the USA alone (Stock et al., 2002) and continues to grow. By not proactively addressing the business issues and opportunities related to reverse logistics (RL) and the value of the products flowing through that system, many companies are not realizing the magnitude of potential economic gain associated with recovered assets (their returns) (Abdulrahman, Gunasekaran and Subramanian, 2014; Daugherty et al., 2001).

Recovered assets, products and packaging, lose their value quickly. If not actively managed by the organization, the majority of value can be eroded away during the RL process. (Blackburn et al., 2004; Souza et al., 2004). Yet organizations fail to realize that the returns environment has changed and that their returns process and RL systems should change accordingly to maximize the value of recovered assets (Blackburn et al., 2004; Mollenkopf et al., 2011; Souza et al., 2004). Organizations can learn to actively manage their reverse supply chains by breaking the RL system down into its component parts and addressing each in a systematic manner, much like is done with the forward supply chain (Guide Jr. and Van Wassenhove, 2003; Shaik and Abdul-Kader, 2014).

This paper is written as an effort to increase the transparency of the reverse supply chain and aid in the diffusion of management tools and performance measures. The focus of this paper is on one step in the RL process, the disposition decision. The RL disposition decision is defined as a decision that leads to the "establishment of an organizational policy regarding which recovery option to pursue for a specific product or line of products" (Hazen et al., 2011). Disposition decisions are key to maximizing the value recovered from returned assets and are therefore pivotal to the RL system. Many papers have explored the types of disposition options that are available to firms (Caplice and Sheffi, 1995; De Brito and Dekker, 2002; Krikke et al., 2004; Rogers and Tibben-Lembke, 2001; Stock et al., 1997; Thierry et al., 1995; Young, 2000), however, to date the only study that has investigated the disposition decision-making process is Hazen et al. (2011). In their paper, Hazen et al. (2011) perform a content analysis of the RL literature from 2000 to 2010 and create a list of high level decision parameters for disposition decisions.

This paper expands upon the work of Hazen et al. (2011) insomuch as it proposes a qualitative and quantitative selection criteria and performance measures that can be used to evaluate and compare disposition options. The approach taken to develop these measures is based on grounded theory, as it is

both inductive and exploratory and takes a holistic view of RL as a business process. Current literature suggests that a holistic approach to the study of reverse logistics is warranted in order to advance this stream of research (Carter and Ellram, 1998; Dowlatshahi, 2005; Jayaraman and Luo, 2007; Shaik and Abdul-Kader, 2014). The intent of the paper is to contribute to the literature as an initial validation piece establishing parameters and providing qualitative support for certain performance measures to support strategic disposition decisions.

The outline of this paper is as follows. The paper begins with an overview of RL research, specifically laying a foundation to support the need for performance measures in the reverse supply chain. Next, RL frameworks are addressed in order to introduce the importance of the disposition decision within those models. Synthesizing the available literature, disposition options are then explored in detail including a discussion of related classification schemes. At this point the selection criteria and performance measures are proposed. The next section of the paper explains the process that was undertaken to interview managers and invite them to comment on the proposed asset recovery metrics. Their responses are analyzed and discussed along with the notable managerial implications of their response. Finally, the paper concludes with limitations and recommendations for future research.

LITERATURE REVIEW

Reverse Logistics

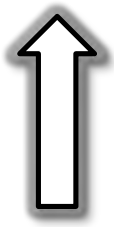
According to Rogers and Tibben-Lembke (1998), RL includes all business activities associated with the "process of planning, implementing, controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information point of consumption to the point of origin for the purpose of recapturing value or for proper disposal." Holistically, RL can be conceived as a process that recovers value from otherwise impaired assets in a cost effective and ecologically friendly manner (Sabharwal and Garg, 2013). This may include extending the products usage beyond its traditionally designed life span (Dowlatshahi, 2000; Dowlatshahi, 2005). In this manner and in order to be inclusive, for the purposes of this paper the (Rogers and Tibben-Lembke, 1998) definition for RL is expanded to exclude the points of consumption and origin. Additionally, as applied in De Brito and Dekker (2003), this paper intends to use RL as an all-inclusive construct that not only includes returns from customers, but also includes internally created impaired assets such as excess or obsolete items and/or spare parts.

There are numerous drivers for organizations to participate in asset recovery via a RL system (Rajagpal, Sundram and Naidu, 2015). These reasons are described in the literature as both voluntary and mandated and can be summarized in three categories: economic (direct and indirect), legislation, and extended responsibility (corporate citizenship) (De Brito and Dekker, 2002; Gungor and Gupta, 1999; Jayaraman and Luo, 2007; Nuss, Sahamie and Stindt, 2015). More specifically, Toffel (2004) describes typical voluntary motives as (i) reducing production costs; (ii) promoting an image of environmentally responsibility; (iii) meeting customer demands; (iv) protecting aftermarkets and (v) pre-empting regulation. Carter and Ellram (1998) further emphasized that the principal driver of RL as a valid business process is the existence of an internal "policy entrepreneur personally committed and willing to undertake responsibility for RL activities."

The drivers mentioned above are primarily associated with the cost effective goal of asset recovery and are concentrated on those product streams where there is some value to be recaptured and the disposition of the asset is into a new market channel (De Brito and Dekker, 2003; Sabharwal and Garg, 2013). There is also a growing trend toward utilizing RL to advance the ecological goals of the organization, customer and larger community (Santos, Andrade, Ferreira and Leme, 2013; Sarkis et al., 2010; Thierry et al., 1995), these are referred to as end-of-life (EOL) strategies wherein the EOL recovery/disposal is planned at the time of creation, production and/or distribution of a product. An early model of EOL strategies for returns is Lansink's ladder developed in 1979 (Willems et al., 2006). As shown in Figure 1 Lansink's

ladder is an ecological hierarchy of EOL options. Despite much research and advancement since 1979, the steps in the ladder resemble the options that are still employed today by organizations making disposition decisions. Disposition decisions, however, are being driven primarily by cost efficiency in lieu of ecological goals (Willems et al., 2006) and are hindered by the lack of deployed resources for RL planning and execution (Daugherty et al., 2001; Tibben-Lembke, 2002).

FIGURE 1
LANSINK'S LADDER ECOLOGICAL HEIRARCHY
(Lansink, 1979)



Disposition decisions, no matter their basis, ecological or economical (these are not mutually exclusive), begin with an understanding of the items returned. There are four types of returns that are generally included in a closed-loop supply chain. These include EOL, end-of-use (EOU), commercial and reusable returns. Figure 2 illustrates an integrated supply chain and shows graphically the differences between these four types of returns. More specifically, they are defined by Krikke et al. (2004) as follows:

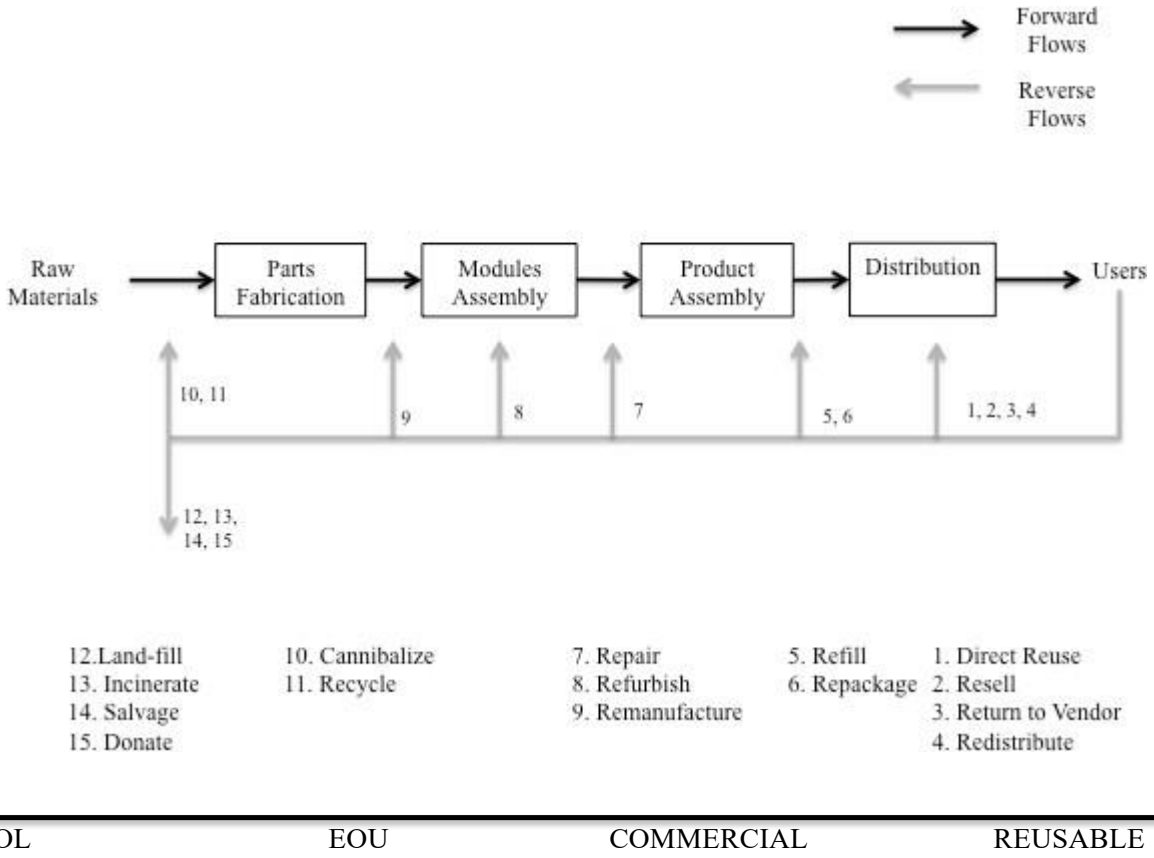
- *End-of-Life* – these are taken back from the market in order to meet environmental standards or legislation. These are generally managed according for formal rules or regulations. Typical items that are collected in this category include tires, batteries, packaging and vehicles.

- *End-of-Use* – these items are typically returned after usage at the end of a lease, as a trade-in or for product replacement. Many cases these have a high economic value and can be repaired or remanufactured.

- *Commercial Returns* – these are generally returns from the business to consumer sales process. They are returned shortly after the original sale and are associated with either product defects or a poor out of box experience.

- *Reusable Items* – these returns are associated with the consumption of the main product or consumable. These returns include such things as pallets, refillable cartridges and bottles.

FIGURE 2
REVERSE SUPPLY CHAIN & DISPOSITION OPTIONS
(*Adapted from Thierry et al., 1995*)



A detailed description of each step within a RL system or closed-loop supply chain is beyond the scope of this paper. The reader is, however, directed to a substantial and exhaustive literature review completed by Ilgin and Gupta (2010).

RL Disposition Options

Returns management and asset recovery require that products be acquired from the user and transported to a centralized location. As items arrive they are inspected and sorted, at this point the company must decide what to do with the goods (Tibben-Lembke, 2002). This critical point in the process is referred to for the purposes of this paper as the disposition decision point. This is the point in the process upon which this research is focused.

Asset recovery includes the classification and disposition of returned goods, surplus, obsolete, scrap, waste and excess material products, and other assets, in a way that maximizes value recapture to the owner, while minimizing costs and liabilities associated with holding or disposing of the impaired assets (Mollenkopf et al., 2011; Rogers and Tibben-Lembke, 1998; Sabharwal and Garg, 2013). Many times there are trade-offs that must occur at this point in the process (Young, 2000). For example, in order to meet the desired ecological goals of the organizations stakeholders or the community at large managers may need to choose an option that does maximize economic gain to the organization. However, there is little written about this important decision making process and no decision models or performance metrics

have been published that specifically support asset recovery management disposition decisions (Bernon et al., 2011; Hazen et al., 2011).

Based on a synthesis of current literature a comprehensive list of disposition options has been adopted for this research (Bernon et al., 2011; Blackburn et al., 2004; Carter and Ellram, 1998; De Brito and Dekker, 2002, 2003; Guide Jr. et al., 2003; Ilgin and Gupta, 2010; Krikke et al., 2004; Kumar et al., 2007; Meade and Sarkis, 2002; Rogers and Tibben-Lembke, 2001; Rubio et al., 2008; Young, 2000). (See Table 1 Disposal Options and Descriptions) These options are divided into three disposition categories direct recovery, indirect recovery and disposal (De Brito and Dekker, 2002).

There is a distinct gap when it comes to providing direction on choosing between competing disposition options (Hazen et al., 2011). Likewise, the literature has not matured to the point of providing guidance regarding performance measures that can be used to make disposition decisions and then by which to track their actual performance to expectations. The next section of this paper sets out to begin filling this gap in the literature by proposing asset recovery metrics that can be used to choose between options and to subsequently track their performance. The research utilizes a foundation of definitions set out by Rogers and Tibben-Lembke (1998) and pursues a holistic approach by establishing selection criteria and performance metrics that can be integrated into overall business strategy.

Performance Metrics

Current literature does not include decision metrics or performance measures for disposition options. This is partly due to the complexity and individuality of each firm's strategy regarding their reverse supply chain (Caplice and Sheffi, 1995). Because most reverse supply chain strategies are still in their infancy (Dowlatshahi, 2005) few best practices, metrics or measures are in place and industry standards are not established. Formal modeling based on analytical and objective tools is lacking (Bai et al., 2012). Notably, authors have begun to call for the integration of tangible and intangible measures to assist in managing the every changing requirements of the supply chain both in forward and reverse flows (Bai et al., 2012).

Bernon et al. (2011) notes that they found several performance criteria in the literature, however, they were not integrated into performance systems so as to become a measurement or decision tool. Utilizing a total of 9 group discussions with supply chain managers (average 18 present in each session) Bernon et al. (2011) found that the participants advocated an integrated approach to performance management for reverse logistics. The authors specifically addressed scorecarding with the supply chain manager groups. A development from this discussion was a consensus that scorecarding may be a viable method to assist in avoiding dysfunctional behavior between functions within the organization (Bernon et al., 2011).

The cross-functional nature of reverse logistics has been cited in the literature as a stumbling block or barrier to implementation of effective and efficient reverse supply chain programs (Carter and Ellram, 1998; Kaynak, Kocoglu and Akgun, 2014). This is seen again in the interview sessions executed by (Bernon et al., 2011). This is strong support for a holistic approach to researching and managing reverse logistics (Carter and Ellram, 1998; Dowlatshahi, 2005). As suggested by Toffel (2004), with proper coordination between functions, cross functional management and continuous improvement capabilities can allow organizations to establish feedback loops from the RL core functions to other department to enable better EOL planning and design improvements. This coordination is also supported by research by Gungor and Gupta (1999) and Akcalı and Cetinkaya (2011).

SELECTION CRITERIA AND PERFORMANCE MEASUREMENT DEVELOPMENT

The purpose of the paper is to establish qualitative and quantitative selection and performance measures to support an organization's reverse supply chain disposition decisions. To serve this purpose, both a quantitative model and a qualitative analysis tool are created. These proposed tools were then taken to 12 managers across diverse industries to get their feedback on the viability and usefulness of the RL tools. This methodology is built upon grounded theory as described by Strauss and Corbin (1998) as it is based upon qualitative research including interviews with concurrent and subsequent analysis. Concepts are the unit of measure in this type of analysis (Strauss and Corbin, 1998). Categories are developed and the analysis makes use of constant comparisons and patterns (Strauss and Corbin, 1998).

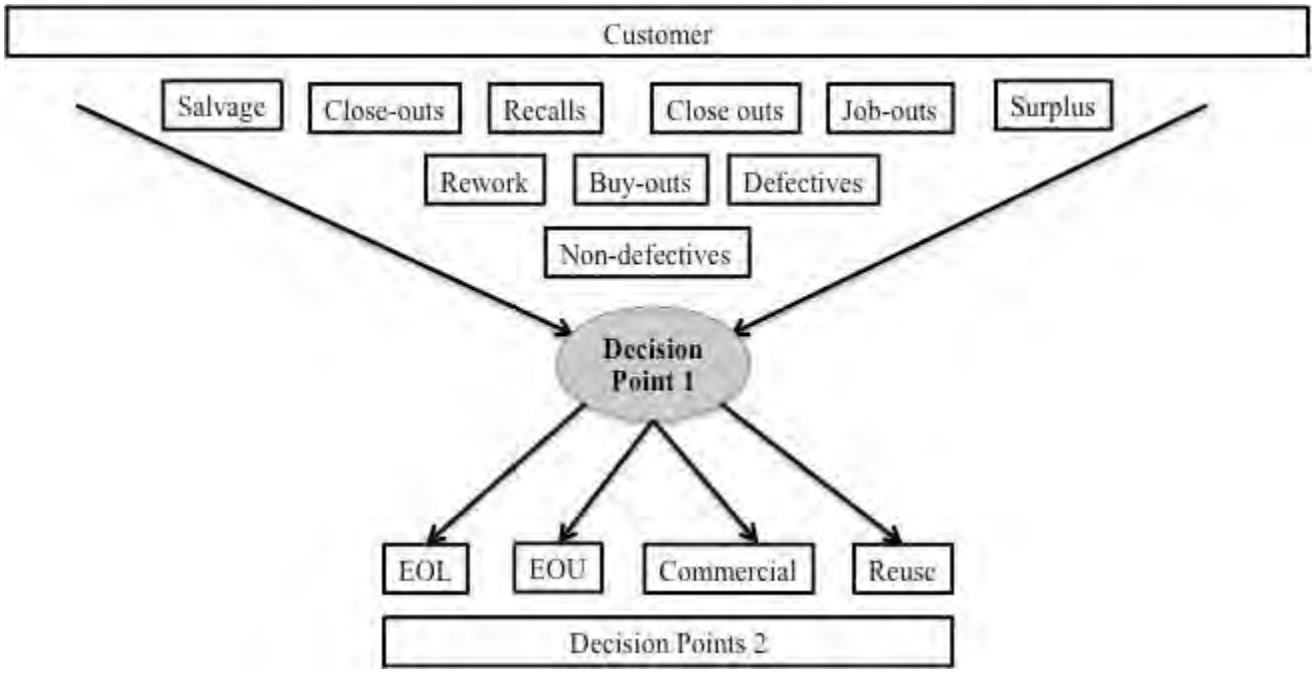
Disposition Scoring Model

The first step in this process was to build a disposition scoring model to differentiate between types of returns and evaluate potential disposition options. The disposition scoring model is built upon three fundamental keystones: classification scheme for returns, classification scheme for disposition options and a scoring system to evaluate and compare options. These keystones are developed in this section of the paper.

Return Classifications

This paper adopts the four categories of return as described by (Krikke et al., 2004): end-of-life, end-of-use, commercial and reuse. Each of these is fed by the sub-categories based on the reason for the return as shown in the diagram below (see Figure 3).

FIGURE 3
RETURN CATEGORIES



In order to categorize the returns into the four categories end-of-life, end-of-use, commercial and reuse, they must be inspected at the node shown above and entitled (decision point 1). It is proposed that at this point the returns be categorized with a coding scheme and in the form of a returns tracking unit (RTU), to be created and used similarly to the commonly known and used stock keeping unit (SKU), that would identify the item and its condition and classification and could readily be stored, tracked and shared between departments in formal or informal information systems or within information sharing processes. Realizing that the classification scheme needs to be flexible so that it can be tailored to an organization the following scheme is set forth as merely an example (see Table 2). This coding schema allows an RTU to be tracked systematically, planned for receipt in other departments and creates historical documentation that can be utilized by other functions such as quality or engineering. Institution of such a classification scheme can also assist a firm in early product differentiation in order to help maximize the value of the product whose value is dropping rapidly (Souza et al., 2004).

TABLE 2
TYPE OF COMMERCIAL RETURNS
(Adapted from Rogers and Tibben-Lembke, 1998)

Type	Attributes
Close-outs	First quality products that the retailer has decided to no longer sell.
Buy-outs (Buy-backs)	One manufacturer buys out a retailer's supply of a competitor's product.
Job-outs	First quality seasonal, holiday merchandise.
Surplus (Excess)	First quality overstock, overrun, marketing returns and slow moving items.
Recalls	Products that are suspected to be defective and can present safety concerns are returned to vendor.
Defectives	Products discovered to be defective (non-systemic defects).
Non-Defective Defectives	Products thought incorrectly to be defective.
Salvage	Damaged items.
Rework	Product with packaging that has been damaged in shipment or was packaged incorrectly.

The return reasons utilized in Figure 3 and the returns coding shown in Table 2 have been extended from those described by Rogers and Tibben-Lembke (1998) to include recall and rework. Although recalled items are similar to close-outs insomuch as they are discontinued item, they are distinctly different in the manner in which they need to be disposed (De Brito and Dekker, 2003). Additionally, recalled products may need to be tracked separately from other inventory assets to satisfy accounting, risk management and/or legal requirements. Rework is added to the return reasons to identify those items that are returned such that the product itself is non-defective, but the packaging must be replaced or the pack-out needs to be changed (De Brito and Dekker, 2003). For example, a pallet of products may be shipped to a customer with the wrong pack-out, which means that the items were not kitted properly. When this happens a

customer may return pallets of product back to the vendor to be properly kitted. The suggested return reason codes are defined in Table 3.

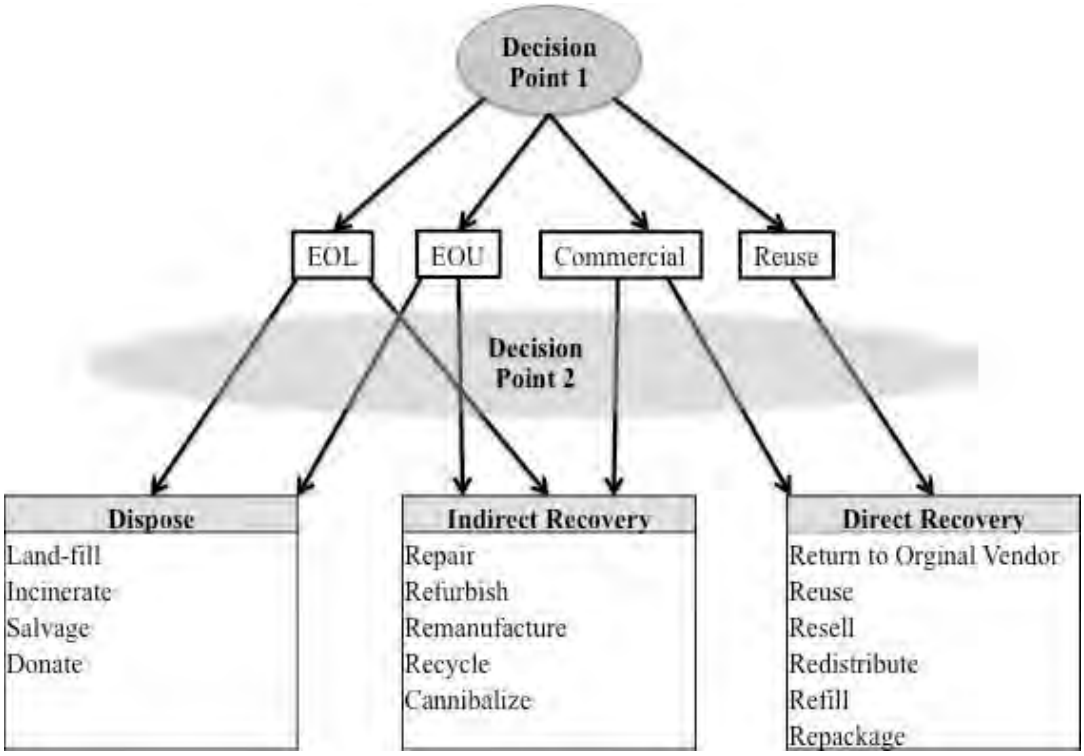
TABLE 3
CODING SCHEME FOR RETURN TRACKING UNITS (RTUS)

#	Based On	Levels	Codes
1	Proportion of the value of the item	Product, Packaging	PR, PA
2	Condition of the product	EOL, EOU, Commercial, Reuse	L, U, C, R
3	Reason for return	Recall, Close-outs, Buy-outs, Job-outs, surplus, Defectives, Non-Defective Defectives, Salvage, Rework, Other	RC, C, B, J, SU, D, N, SL, RW, O
4	Physical characteristics	Metals, Non-metals, Alloys, Other	M, NM, A, O
5	Source of return	Manufacturing returns, distribution returns, consumer/end user returns, other	M, D, E, O
6	Industry	Electronic, Automobile, Textile, Retail, Other	E, A, T, R, O
7	Type of product	Finished goods, sub-assembly, loose components, machines, tools, other	FG, SA, LC, M, T, O

Disposition Classifications

As shown in Figure 3 in the previous section return classifications and the assignment of RTUs allows a firm to sort, track and route the returns accordingly. In order for returns to be processed effectively and efficiently, they should be separated from the forward channel because of the different strategies and priorities associated with the different flows of materials and products (Rogers and Tibben-Lembke, 2001). Timely classification and coding (RTU assignment) will assist in this separation both physically and within a firm's information. Additionally, this type of classification scheme will facilitate Decision Point 1 as shown in Figure 3. This is the first step in the disposition decision process. The product must be identified as EOL, EOU, commercial or reuse as earlier defined. These narrowing of classifications reduces the options available to the decision maker in order to facilitate and speed the decision making process. See Figure 4 below that illustrates this portion of the decision making process (for ease of reference Figure 3 and Figure 4 are combined in Appendix A).

FIGURE 4
DISPOSITION OPTIONS



Based on this formal decision making process, a matrix could be built and used as a decision making tool. See the template created as an example and shown in Appendix B. Such a tool can be customized to meet a specific company and/or products needs or requirements. There are situations when the option for disposition is limited by legal or other restrictions and this should be communicated clearly to the manager responsible for making the disposition decision (Stock and Mulki, 2009). The proposed matrix can assist in communication such restrictions.

Quantitative Scoring System

In this section a scoring system is developed to assist the decision maker in quantitatively differentiating between competing disposition options. As can be see in Figure 4, in each disposition category (EOL, EOU, commercial and reuse) there is more than one disposition option. In order to choose between those options, this section develops a quantitative analysis to aid in choosing the most economical option. The quantitative analysis should be considered in conjunction with certain qualitative performance measures. Qualitative performance measures are discussed in the next section.

The magnitude of the score for a given disposition option i (DO_i) is given in equation 1. The score reflects the expected net value of implementing a strategy for a given return.

Score for Disposition Option$_i$ $DO_i = S_i =$

(Expected Recovery Value of DO_i) - (Value of RTU(s) under consideration) -

(Total expected cost of implementing DO_i)……Eq.1 (1)

It is important to note that the score calculation assumes an accrual-based value for the RTU. However, this calculation can be adapted to consider a cash flow basis depending on the priorities of the organization.

Value of RTU:

The motivation behind this parameter is to clearly state the book value of the RTU. This should be the original manufacturing cost or purchase price less any excess inventory or obsolescence accruals that apply to the subject RTU or group of RTUs.

Total expected cost of implementing DO_i:

This parameter is intended to include both the expected product recovery costs and environmental costs. Product recovery costs represent the fixed and variable costs of such things as required facilities, staffing, supplies, transportation, etc. associated with the disposition option. Total environmental cost is the summation of all the costs that are expected by the organization for environmental conformance with respect to a given disposition option. See Eq. 2 below.

Total expected cost of implementing DO_i =

(Total Expected Product Recovery Costs DO_i) +

(Total Expected Product Recovery Costs DO_i)……..Eq.2 *(2)*

Expected Recovery Value of DO_i:

The expected recovery value of a given disposition is the amount that is expected to be recovered in the disposition of the RTU. It is suggested that recovery values be tracked so that the historical values can be used to assist in this estimation for scoring purposes.

S_i:

After evaluating the three components of Eq.1, they are used in the equation to develop scores for each available disposition option. The maximum score is the most favorable to the organization.

By utilizing such a scoring model organizations can better understand the true costs (both cash and non-cash) that are associated with returns. Many organizations do not realize the critical nature of returns and their impacts to the profitability of the firm and are likely to only see returns as an operating expense associated with doing business (Stock and Mulki, 2009). This type of tool allows the organization to set aside prior conceptions of returns and look at dispositions in an objective manner.

Qualitative Analysis and Scoring

Qualitative analysis should occur simultaneously with the quantitative scoring in the preceding section. Realizing that qualitative metrics are highly subjective and vary depending on the needs of the specific organization and/or industry, the qualitative selection criteria presented here are intended to be directional and may be adopted or used as a road map to an organization implementing such a tool. Table 4 includes operational factors in RL systems as adapted from Dowlatshahi (2002).

TABLE 4
QUALITATIVE PERFORMANCE MEASURES
(Adapted from Dowlatshahi, 2002)

Measure	Yes	No
Use of computer network technology capable of tracking the returned products		
Reliability tests for determining the degree an extent of reusability of products		
Establishment of provisions for secondary markets for unwanted items		
Use of existing transportation routes and schedules		
Use of inter-modal transportation on a timely basis		
Availability of detailed shipping and receiving data for the proper handling and management of returned items		
Presence of economic benchmarks for acceptance / rejection of returned items		
Use of shipping in bulk and cube utilization		
Presence of separators (bins, place) for FSC and RSC items		
Use of existing warehousing functions and facilities		
Use of current warehousing methods and equipment		
Compliance with EPA, OSHA, ISO 14000		
Special storage requirements for storing returns (e.g., refrigerated warehouses)		
Do the supply chain partners comply with environmental and federal regulations		
Presence of educational and training programs		
Promotion of industry wide cooperative efforts		
Conformance of regulatory packaging		

Used in conjunction with each other, the decision framework shown in Figures 3 and 4 along with the quantitative and qualitative analysis and scoring models will allow an organization to taken into consideration the multiple dimensions of an asset recovery as described by (Akcalı and Cetinkaya, 2011):

- Motivation behind product recovery
- Form of product recovery
- Activities needed by the form of recovery
- Agents of the recovery process
- Location of the recovery activities

Additionally, by utilizing this information and capturing it for historical purposes the organization can create performance metrics by which to monitor the results of their disposition decisions and gauge them against the goals and strategies of the organization. The next section presents high-level performance metrics that can be implemented by an organization that adopts decision tools such as those proposed in the preceding sections.

Performance Measures

The selection of RL performance measures will vary from company to company. The metrics that are used in each depend on the end user (Caplice and Sheffi, 1995). Based on a review of the literature Caplice and Sheffi (1995) developed a list of eight criteria that represent the general characteristics of "good" performance metrics (see Table 5). Those eight criteria were used in the development of the suggested performance measurements proposed by this paper. Additionally, these measures span three dimensions of effectives used in logistics practice: utilization, productivity and effectiveness (Caplice and Sheffi, 1995).

The suggested performance measures for a RL system are shown in Table 6. These have been subdivided into types (strategic, tactical and operational) (De Brito and Dekker, 2002) for ease of reference and application. While most of these measures are self-explanatory, explanation has been provided for Gate-keeping Efficiencies and Total Average Collection Deviation (TACD).

1. *Gate-keeping Efficiencies* – the role of a gate-keeper is to decide which products to allow into the RL system (Rogers and Tibben-Lembke, 1998). For example, this could take place when a customer requests authorization for a return. In many instances a return authorization (RMA) is required in order for a customer's return to be accepted into the system. The gate-keeper is responsible for denying returns that are not qualify for return such as items that are out of warranty. This step is a key function within an efficient RL system (Rogers and Tibben-Lembke, 1998).

2. *Total Average Collection Deviation (TACD)* – in this context "collection" refers to the goods that enter into the RL system at the gate-keeping site and are transported to the asset recovery facility. TACD is a measure intended to check the deviation of goods shipped and received.

TABLE 5
DEFINITIONS OF THE EIGHT METRIC EVALUATION CRITERIA
(Caplice & Sheffi, 1994)

Criterion	Description
Validity	The metric accurately captures the events and activities being measured and controls for any exogenous factors.
Robustness	The metric is interpreted similarly by the users, is comparable across time, location, and organizations, and is repeatable.
Usefulness	The metric is readily understandable by the decision maker and provides a guide for action to be taken.
Integration	The metric includes all relevant aspects of the process and promotes coordination across functions and divisions.
Economy	The benefits of using the metric outweigh the costs of data collection, analysis and reporting.
Compatibility	The metric is compatible with the existing information, material, and cash flows and systems in the organization.
Level of Detail	The metric provides a sufficient degree of granularity or aggregation for the user.
Behavioral Soundness	The metric minimizes incentives for counter-productive acts or game-playing and is presented in a useful form.

TABLE 6
RL PERFORMANCE MEASURES

Strategic	Tactical
Acquisition costs of additional equipment to remanufacture products ($)	Return shipment cost ($)
Acquisition costs of additional warehouses, transportation fleets, etc.	ECAR % Environmental Conformance of Asset Recovery (AR) = 100 * (# of environmentally conformed products / # of products recovered by AR)
Long-term labor costs to employ additional skilled workers ($)	# of production shifts per unit of time
Average distance of suppliers	% of transportation fleet owned
	Service level of customers of remanufactured products.

Operational	
Obsolescence ratio = total value of obsolete products / total value of inventory per unit of time.	% of employees devoted to return products per unit of time
Gate-Keeping Percentage (GKP) = % of products returned at the gate keeping site.	Cost per mile for transportation before AR
IDT = Total idle time of trucks at gate-keeping site per unit of time	Cost per mile for transportation after AR
Gate-Keeping Efficiencies	Reduction in processing time
Total Average Collection Deviation (TACD)	Reduction in packaging cost
FA rsc	Recycling Fraction = (fraction of products returned for recycling) * (fraction of materials in the product recoverable) * (fraction of materials actually recovered) (Scott et al., 1997)

In additional to the strategic, operational and tactical performance metrics in Table 6, a scorecard of financial metrics is also proposed. The components included on the scorecard are Cost, Value Recovery, Required Space, Processing Time and Quantity of Products. Each of these components is monitored from forecast to actual results. In addition to providing high-level performance metrics, these items can also be used to compare disposition options to one another. Key disposition options have been included on the scorecard for illustrative purposes as shown in Table 7.

TABLE 7
ASSET RECOVERY SCORECARD

Measure	Remfg.	Recycle	Reuse	Refurbish	Landfill	Stockpile
Cost $_{actual}$ (C_a)						
Cost $_{forecasted}$ (C_f)						
Cost accuracy = $1–(\|C_a - C_f\| / C_a)*100$						
Value recovered $_{actual}$ (V_a)						
Value recovered $_{forecasted}$ (V_f)						
Value accuracy = $1–(\|V_a – V_f\| / V_a)*100$						
Required. Space $_{actual}$ (S_a)			N/A		N/A	
Required. Space $_{forecasted}$ (S_f)			N/A		N/A	
Required. Space accuracy = $1–(\|S_a – S_f\| / S_a)100$						
Processing time $_{actual}$ (T_a)						
Processing time $_{forecasted}$ (T_f)						
Processing time accuracy = $1–(\|T_a – T_f\| / T_a)*100$						
# of Products $_{actual}$ (P_a)						
# of Products $_{forecasted}$ (P_f)						
# of Products accuracy = $1–(\|P_a – P_f\| / P_a)*100$						

EMPIRICAL VALIDATION

Research Methodology

The purpose of this research is to develop selection criteria and performance measures to support RL disposition decisions. A qualitative approach was used to provisionally verify the criteria, measures and scorecard presented in the earlier sections of this paper. This was done by interviewing managers regarding the RL activities in their firm and by soliciting their feedback on the proposed criteria, measure and scorecard. This type of qualitative research plays an important role in accessing and generating discussions with key decision makers in organizations and with industry experts (Wright, 1996).

The interviews were designed to be part of a site visitation and followed a 6 step method adapted from McQuarrie (1991):

1. Set research objectives
2. Identify, select and recruit participant organizations
3. Select and train teams
4. Develop the survey interview instrument
5. Conduct interviews
6. Analyze, report and discuss results

Additionally, the interviews followed a prepared script. This was in the form of a questionnaire that included quantitative and qualitative responses regarding their own company's RL systems and strategies and regarding the proposed disposition criteria, performance measures and scorecard. The interviews were designed to address the following research questions:

a) What level of reverse supply chain integration is achieved in the organization?
b) How does the model perform in evaluating the disposition options and adoption of the right disposition strategies?
c) How resourceful are the qualitative selection criteria and are they applicable to disposition decisions?
d) How well does the proposed scoring model capture needs of the organization?

The participants represent both firms whose major focus is reverse logistics and firms whose primary business is impacted by reverse logistics issues. The interview process averaged two to three hours in order to facilitate in-depth responses. A profile of management respondents and organizations is shown in Table 8.

Results and discussion

The following discussion is thematically grouped by research question and represents the data that was collected during each of the 12 interviews.

What level of reverse supply chain integration is achieved in the organization?

The analysis revealed distinct differences in RL system management with the subject organizations. The lines of delineation were based on two key criteria *continuous vs. discrete product units* and *industrial vs. consumer goods*. For example, company 2 is in the oil and gas industry. Their reverse supply chain is focused on the recovery of CO_2 from their production process (continuous product units).

> *"The CO_2 is stripped out in the plan and the CO_2 is reinjected back into the nature gas/oil reservoir."*

Eighty percent of their supply chain budget is focused on the reverse supply chain and the traverse time of the product in the RL system is less than 1 minute. 1% of the oil and gas companies employees are involved in the RL system.

This is in stark contrast to the next highest budget appropriation for the reverse supply chain which is 25% in an automobile financing organization. In this case the returned unit (discrete product unit) resides in the RL system 23-25 days. 85% of this company's employees are involved in the RL system.

> *"After vehicles come to maturity in the lease portfolio or repossessed due to non-payment they are picked up from either the dealership lot or repossession yard to be reconditioned for sale at either open or closed markets, internet based or live auction."*

The majority of differences between industrial and consumer product companies RL systems and disposition activities are based on the contractual agreements between vendors and customers. The interviews revealed that many times the disposition options of the firm are limited by the customer contracts for specialized or patented products.

In an attempt to understand the integration of RL within the firm, data was collected to determine the number of departments within the organizations that were involved in RL activities and the level of communication complexity between those departments. Table 9 shows the number of departments that are involved in the RL system by company. The table also indicates the level and complexity of the communication between those departments.

The levels and complexity of data were rated from very rarely (1) to often (5). The only company each type of communication as "very often" was a service organization. This company also has the most departments (10) participating in the RL system and rated the information exchanged as "complex." The type of information exchanged within their RL system of the remaining companies is rated as "medium" to "complex," the frequency of exchange is less than expected for companies that are moving complex information through their organizations and or information systems.

How does the model perform in evaluating the disposition options and adoption of the right disposition strategies?

The return categorizations and asset recovery methods (disposition options) outlined in this paper were presented to the interviewees. They were asked if these return categories and disposition options applied to their organization. The intention of the question was to determine the validity and the generalizability of the proposed return categories and disposition options.

The responses were positive, each of the return types presented used in at least two of the interviewed companies. The recovery methods, in contrast, are less universal. Specifically, "stockpile" and "landfill" were only mentioned by one company each. This section of the interview received the least complete responses from the interviewees. It is likely that this is due to confidentiality concerns, although no one expressed that concern directly.

How resourceful are the qualitative selection criteria and are they applicable to disposition decisions?

The qualitative selection criteria outlined in this paper were presented to the interviewees. They were asked if these criteria were resourceful and if they applied to their organization. The intention of the question was to determine the validity, applicability and generalizability of the proposed criteria.

Two of the criteria were used by 11 of 12 companies. These included: “Use of computer network technology capable of tracking returned products” and “Do the supply chain partners comply with environmental and federal regulations?”

The least applicable criteria included: “Use of inter-modal transportation routes and schedules” (4 companies); “Use of shipping in bulk and cube utilization” (5 companies); and, “Special storage requirements for storing returns” (3 companies).

Although the participants acknowledged using the proposed or similar criteria in their reverse supply chain decisions, none of the companies admitted to having performance monitoring systems in place. Each of the interviewees agreed that performance monitoring is important and should be built from best practices. Even further after the interviews each company indicated that they now intend to pursue performance measures for the RL systems in their company.

How well does the proposed scoring model capture the needs of the organization?

The scoring model in this paper was presented to the interviewees. They were asked if the model would capture the needs of their organization. The intention of the question was to determine the validity, applicability and generalizability of the proposed scoring model.

The majority (7) of companies interviewed said that the scoring model would be effective for their company and that the framework presented with the scorecard would be useful in the management of their RL systems. One of the companies produced a copy of a document to show that they were already using a similar model to manage their reverse supply chain. Another commented that it would be useful not only for monitoring the system, but also for data capture that could be used in future forecasts. Finally, the last two comments were similar, they both suggested that that the model would be helpful in their organizations to help build the business case in quantifiable terms to support disposition options. This type of quantifiable analysis was not currently being undertaken in their organization.

The remaining companies (5) interviewed provided comments suggesting that the model would not be useful. The comments covered a continuum from this is “just a cost of doing business” to “we are constrained by our customer contracts.” The majority of negative responses simply indicated that these types of costs are not captured by their organization, despite materiality.

MANAGERIAL IMPLICATIONS

Similar to earlier findings, this research indicates that many companies are not placing importance on returns nor their reverse supply chain and for the most part are not using metrics or benchmarks (Stock and Mulki, 2009). This fact cut across all industries and company sizes for the companies interviewed for this research.

Despite the seeming lack of importance applied to the reverse supply chain and the negative response to the scoring model by 5 of 12 respondents, all of the managers interviewed agreed that they should have some sort of RL best practices in place in their organization. Perhaps this dichotomy of responses is due to the perceived complexity of implementing and actively managing the RL system. Or, perhaps it is due to the cross-functional nature of the reverse supply chain (Jayaraman and Luo, 2007) and the resulting added complexity. The companies interviewed revealed that their RL responsibilities spanned from 1 to 10 departments within their organizations. Situations of interdepartmental complexity cause departmentalization and increased difficulties in implementing and monitoring change (DiMaggio and Powell, 1983; Meyer and Rowan, 1977).

The interviews revealed a clear need for additional guidance in the form of best practices, scorecards, performance measures, etc. Each manager expressed interest in improving their RL systems and learning more about how to exploit disposition options for the benefit of the firm. Another need that surfaced during the interviews was the need for increased communication and data sharing/visibility among departments responsible for RL functions. This communication may also include the automation of some processes within the system.

The design of a RL system has three vital parameters: value, time and volume. The methodology developed here strives to serve the value parameter. This can be viewed as the initial step in a series of continuous improvement initiatives, which can be followed by methodologies to improve time and volume. It is likely that in many instances a scoring model such as presented in this paper will provide valuable input that may lead to improvement in the other two parameters.

FUTURE RESEARCH OPPORTUNITIES AND LIMITATIONS

Several limitations to this research should be noted. Interviews are subject interviewer bias and a small number of interviews cannot claim to representative of a broader population (Strauss and Corbin, 1998). Additionally, our interviews focused on one actor within the organization namely the supply chain manager limiting the responses to the knowledge of the supply chain management. This is exacerbated as a weakness because, as we learned in the interviews, the RL system spans multiple functions within each organization and there seemed to be no standardization as to which departments were involved in the process from company to company.
Another limitation is due to the lack of previous literature on returns disposition decisions. The majority of research in RL is anecdotally or case study based and only a few researchers address the disposition decision (Stock and Mulki, 2009). None of those address these decisions through an empirical lens (Hazen et al., 2011). This lack of prior research provides a weak foundation for the development of a disposition scoring model that can be tested empirically. However, this paper attempts to bridge that gap through an inductive analysis and initial validation of parameters for RL disposition decisions.

There is much room for future research in this arena. Aiming at improving the flow of materials through the reverse supply chain and improving the economic impact to the firm, while being socially responsible, takes a holistic view of manufacturing and distribution and entails understanding simultaneous activities across multiple departments within the firm. A cross functional view of the RL system can be modeled to give better understanding to the overall function of the revere supply chain. This cross-functional view could then be tested across industries for generalizability. It may be found that RL systems and functional interdependencies differ significantly by industry. If this is the case, it would be beneficial to know what the differences are so that models, best practices and scorecards could be developed to benefit practitioners in each industry (Agrawal, Singh and Murtaza, 2016). The success, measured in terms of economic and socially responsible asset recovery, of each different RL structure could also be captured and compared such that the strengths of each could be quantitatively and qualitatively captured.

Additionally, it is made clear in earlier literature and in the interviews within this paper that RL decisions are multi-dimensional. Because of the nature of these decisions a recursive model such as that derived using ANP (analytic network process) could be utilized. ANP is capable of considering the quantitative, qualitative, tangible and intangible factors within RL disposition decisions (Meade and Sarkis, 2002). ANP is capable of accounting for the multiple dimensions that have been found within the disposition decision (Meade and Sarkis, 2002).

CONCLUSION

Through a qualitative grounded theory approach, this paper has provided empirical data to enrich our understanding of organizational RL disposition decisions. This research approach, though not statistically generalizable, is appropriate in this situation as this paper seeks analytical generalization (Yin, 2003). Utilizing the insight gained from the interviews in this research the return categorization framework, the selection criteria, performance measures and scorecard developed in this paper can be improved and tested with a larger audience. This research is intended to provide a foundation for future research in the important discipline of return disposition management.

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MBA Program Portfolio Approach to Assist Students in Career Transition

Many MBA students aspire to make a career change upon the completion of their graduate degree. In fact, these "planned for" and "hoped for" career transitions are often a leading motivating factor driving MBA program enrollment. MBA program design can facilitate this transition by helping students tell their individual stories of where they have been, what they have done, and what they hope to do in the future. By using tools for career discovery during orientation and presenting a portfolio model at the start of their MBA studies, students are encouraged to consciously create a comprehensive set of experiences throughout their coursework which will enable their eventual career transition. Specifically, students are encouraged to strategically choose projects and opportunities throughout their MBA education which will build their network of contacts in their chosen field, add to their portfolio of practical learning, and advance their career preparation. Rather than thinking of each project as a stand-alone course requirement, students are instructed to design these experiences to build on each other. In the middle of the MBA program, students enroll in a management course where they are provided with additional opportunities for career exploration. In the final capstone course of the MBA program, the portfolio model is revisited as students present their individualized portfolios to their classmates. This approach serves to connect student experiences throughout the MBA program. Graduates are able to maximize the value of the choices they make within individual courses to attain their career goals upon completion of the MBA degree.

MEDICAL BATTERY: WHEN PATIENT RIGHTS CONFLICT WITH QUALITY OF CARE

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ABSTRACT

An important legal issue with potential ethical, monetary and patient care implications involves the revocation of informed consent and the potential for a lawsuit based on medical battery. In performing medical or surgical procedures, healthcare providers frequently are told to "stop" by patients. Sometimes these situations involve patients attempting to avoid something as simple as installation of eye drops or a part of a routine medical examination. For instance, a claim was brought against an ophthalmologist for failing to remove an automatic blood pressure cuff during a procedure to remove a small mass from a patient's lower lid. Medical battery is discussed. Case law involving the revocation of informed consent is reviewed. The author conducted a 2015 Healthcare Survey of healthcare providers and the results are analyzed. Ethical considerations are discussed and suggestions are made for recognizing situations in which a physician should stop a procedure and thus avoid a potential legal conflict.

Introduction

Coulter v. Thomas, 33 S.W. 3d 522 (Ky. 2000) is a case that stunned many observers in both the medical and legal communities. According to court records, Mrs. Coulter was a 53-year old, totally disabled by rheumatoid arthritis, was 5'3" tall and weighed 250 pounds. In this case, Mrs. Coulter consented to a 15-minute procedure to have a small mass removed from her lower eyelid by Dr. Kent Thomas, an ophthalmologist. To monitor her blood pressure during the procedure, an automatic blood pressure cuff (ABPC) was placed on Mrs. Coulter's arm. After the first inflation, Mrs. Coulter demanded that the ABPC be removed. The cuff was removed after the second inflation and subsequently Mrs. Coulter sued Dr. Thomas for medical battery based on revocation of consent. The lower court failed to instruct the jury on medical battery and Mrs. Coulter appealed to the Supreme Court of Kentucky where she won on appeal. The Supreme Court held that the jury should have received instructions on medical battery and sent the case back to the trial court.

When a healthcare provider is asked to stop a procedure, legal and perhaps ethical issues are raised. Cases addressing revocation of consent and medical battery are reviewed in this paper. Additionally, physicians and healthcare providers were surveyed and asked about whether patients have ever revoked consent, and if so, what were the circumstances and their responses. The results of the survey are examined. Additionally, ethical considerations are discussed and suggestions are made to avoid unwanted litigation.

Medical Battery

Battery consists of an unwanted or unauthorized touching. Battery may be a crime or an intentional tort. Although battery may be a crime, if a doctor is trying to render beneficial treatment, states are reluctant to prosecute for the crime of battery (Edwards). Thus, medical battery is usually a tort (civil cause of action for money damages). Battery may occur with an unauthorized touching or when a patient revokes consent to continue treatment. Negligence (malpractice) or harm is not a necessary element of the tort of battery.

A healthcare provider does not have the right to touch a patient without consent. This is an important principle for a clinician to remember, even if a procedure is being performed in the best interest of the

patient. In a landmark case, Justice Cardozo summarized a physician's responsibility to obtain a patient's consent as follows:

"Every human being of adult years and sound mind has a right to determine what shall be done with his own body; and a surgeon who performs an operation without his patient's consent commits an assault for which he is liable in damages. This is true except in cases of emergency, where the patient is unconscious and where it is necessary to operate before consent can be obtained." *Schoendorff v. Society of New York Hospital,* 105 NE 92, 93 (N.Y. 1914).

"The primary consideration in a medical battery case is simply whether the patient knew of and authorized a procedure." *Blanchard v. Kellum,* 975 S.W.2d 522, 524 (Tenn. 1998). Thus, if consent is absent, the intentional tort of battery may be present and the healthcare provider may be sued for damages. It is interesting to note that medical battery, unlike medical malpractice, does not require expert testimony.

Once a patient knows of and authorizes a procedure, what is required for a patient to revoke consent to proceed? In *Mims v. Boland*, 110 Ga. App 477, 138 S.E. 2d 902 (1964) the plaintiff alleged that she revoked consent for a barium enema. In spite of her objection, the enema was administered. In the Mims case, the court adopted the following two-pronged test to determine whether a patient has effectively revoked consent after a procedure is begun:

To constitute an effective withdrawal of consent after treatment or examination is in progress and potentially subject medical practitioners to liability for assault and battery if treatment or examination is continued, the following two elements are required:

> "(1) The patient must act or use language which can be subject to no other inference and which must be unquestioned responses from a clear and rational mind. These actions and utterances of the patient must be such as to leave no room for doubt in the minds of reasonable men that in view of all the circumstances consent was actually withdrawn.
>
> (2) When medical treatments or examinations occurring with the patient's consent are proceeding in a manner requiring bodily contact by the physician with the patient and consent to the contact is revoked, it must be medically feasible for the doctor to desist in the treatment or examination at that point without the cessation being detrimental to the patient's health or life from a medical viewpoint." *Mims v. Boland,* 110 Ga. App. 477, 138 S.E. 2d 902, 905 (1964)
>
> For instance, during a cataract procedure, the procedure can be safely aborted up until the point that the anterior capsule is opened. Prior to that event, there is minimal risk to the patient; however, after the capsule is opened, there would be adverse consequences associated with aborting the procedure and the patient would have to return for emergency intervention.

South Carolina is the only state that does not recognize a cause of action for medical battery based solely on revocation of informed consent. In *Linog v. Yamplosky*, 656 S.E. 2d 255 (S.C. 2008), the plaintiff was under the influence of anesthesia when she purportedly revoked consent to continue with osseous gum surgery. The plaintiff asked the court to recognize a medical battery claim based on revocation of consent and the court declined to agree. Specifically, the court held that "in order for a patient to pursue a claim stemming from a situation involving lack of or revocation of consent, a physical touching within the medical context, and a resulting injury, the patient must bring this claim under the medical malpractice framework." *Linog v. Yamplosky,* 656 S.E 2d 255 (S.C. 2008). In other words, the patient would have to prove negligence and provide expert testimony to support his or her claim.

Survey Results

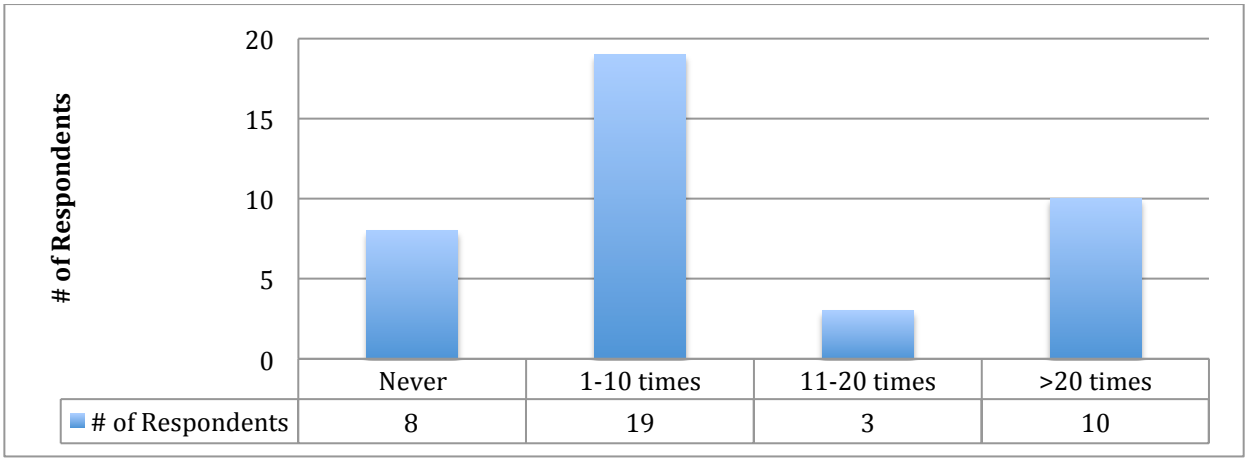
The 2015 Healthcare Survey was sent to approximately 80 healthcare professionals with an overall response of approximately 50%. Forty healthcare professionals responded, 11 females and 29 males. The responses from various medical fields represented in *Chart 1* below.

Chart 1.

SPECIALTY	
Cardiologist	**2**
Emergency Medicine	**3**
Family Doctor	**7**
General Surgeon	**2**
Gynecologist	**2**
Nephrologist	**3**
Nurse Anesthetist	**7**
Nurse Practitioner	**2**
Ophthalmologist	**3**
Optometrist	**3**
Orthopedic Surgeon	**1**
Pediatrician	**2**
Radiologist	**2**
Other (not specified)	**1**
TOTAL	**40**

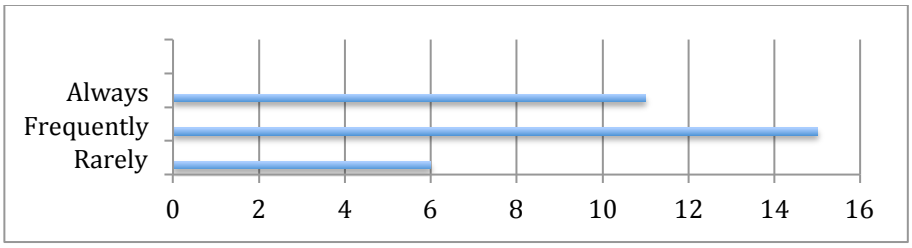
When asked, "During a medical test or surgical procedure, has the patient ever asked you to stop?" 32 (80%) of the respondents answered "Yes" and 20% said that they have never been asked to stop a treatment. *Chart 2* shows the number of times survey participants have been asked to stop a medical test or surgical procedure.

Chart 2



To avoid the possibility of a lawsuit for battery, a healthcare worker should be prepared to react appropriately when a patient revokes consent. Chart 3 illustrates the 2015 Healthcare Survey reponses to requests to stop a medical test or surgical procedure.

Chart 3



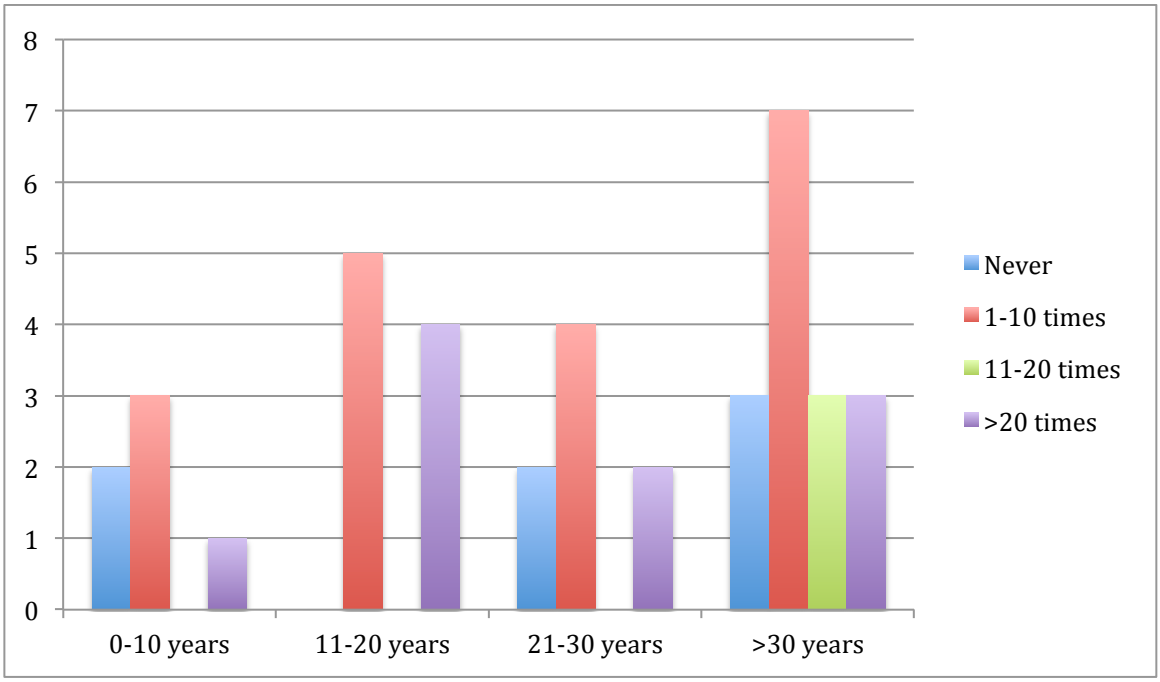
The 2015 Healthcare Survey indicated that 19 of the patient requests to stop involved what the provider considered a preferred practice, 12 patient requests involved an optional practice and 7 of the procedures were classified as "Other". "Other" procedures were self-identified by the healthcare providers as epidurals, pap smears and echocardiograms. Even though not identified as a preferred practice, these "other" procedures could arguably fall under the spectrum of standard of care. In *Chart 4*, the types of procedures that patients requested to have stopped and the number of healthcare workers identifying each type of intervention, are noted in order of frequency.

Chart 4

PROCEDURE	
Draining abscess	**12**
Starting IV	**9**
Rectal exam	**8**
Numbing for sutures	**8**
Ear exam	**7**
Debriding wound	**7**
Blood pressure	**7**
Drawing blood	**6**
Pelvic exam	**6**
Epidural	**6**
Anesthesia mask	**4**
Giving a shot	**4**
Checking eye pressure	**3**
Instilling eye drops	**3**
Throat exam	**2**
Breast exam	**2**
Setting fracture	**2**
Biopsy	**2**
Regional block	**2**
Stress test	**2**
Barium enema	**2**
Central line access	**2**
Ear irrigation	**1**
Catheter	**1**
Liquid nitrogen treatment	**1**
Naso-gastric tube	**1**
Shining a light in an eye	**1**
Finger stick	**1**

Early in a medical practice, a healthcare provider may be asked to stop a treatment. In the 2015 Healthcare Survey, all of the healthcare providers in the 1-10 year category had been in practice less than 5 years. Two-thirds of the "new providers" have been asked to stop the procedures, and, thus, it's important for nascent healthcare providers to be aware of the patient's right to stop a procedure. Of the 2 respondents that indicated that they had never been asked to stop, both were eye care providers. Chart 5 compares the number of years in practice to the number of times a physician has been asked by a patient to stop.

Chart 5



Note: One of the survey respondents did not indicate the number of years in practice; however this physician indicated that patients asked him to stop 1-10 times. This respondent is not represented on the above chart.

Ethical Considerations

The 2015 Survey may indicate either a failure to recognize revocation of consent or perhaps admit that a patient has ever told a healthcare worker to stop (among those survey respondents who denied having been asked to stop). For instance, the 2015 Survey included three Emergency Medicine physicians who had both been in practice for more than 30 years, practicing in the ER at the same hospital—one said that he had never been asked to stop a treatment or procedure while the other physicians reported that they had been asked to stop more than 20 times each.

Failure to recognize revocation of consent could subject a healthcare provider to a lawsuit based on medical battery—an unwanted touching. At the moment that consent is revoked, the physician is required to stop, if medically feasible. To do otherwise is to risk a civil lawsuit. If a healthcare worker is sued for battery, he/she must put forth a defense and this could be time consuming, expensive and stressful.

Conclusion

The 2015 Healthcare Survey raises an interesting ethical question. If, for instance, a patient is checked in to see their eye care physician and then refuses dilation and/or a pressure check, can the doctor adequately assess the health of a patient's eyes? In the event that a patient is uncooperative, should a physician continue, or is failure to perform these preferred practices a dereliction of duty? It is not unusual for a patient to ask a healthcare provider to stop a treatment or procedure. Continuing to perform a beneficial medical treatment or procedure without a patient's consent may be medical battery. It is extremely important for providers to recognize when consent has been revoked and if it is medically feasible to stop. Since there may also be a conflict between the patient's rights and the standard of medical care, it is important for the provider to determine if the intervention is medically indicated. If it is determined that the procedure is necessary, or at least beneficial, then the provider should explain the value to the patient and obtain permission to continue. Following this explanation, if consent is not obtained, then the physician should document the patient's refusal. The above suggestions should help minimize the conflict between standard of care and patient rights.

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Personality and Stress

MONITORING TECHNOLOGY IN YOUR LIFE: A WORK IN PROGRESS

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ABSTRACT

Contemporary information technologies are pervasive in the workplace. While our IT-reliant lifestyle has had a dramatic impact on business productivity it has also caused technology-induced stress, termed technostress. When working properly, information technology streamlines work and improves efficiency of an organization. However, when information technology malfunctions, some workers can find themselves in complete disarray, technostressed, and unable to perform, while others find workarounds and still maintain performance. We know very little about how individual differences affect technostress. This study argues that being stressed is not always the same as feeling stressed, or an individual's physiology does not necessarily correlate to his or her psychology when working on online tasks. More specifically, we believe that personality can cause individuals to over or underreact to techno-stressful situations and thus at times cry wolf when complaining about the affect work has on their stress level. To do this, we seek to examine four personality characteristics that we believe explains the most variance in both stress and strain: locus of control, social desirability, fear of negative evaluation, and propensity to worry to see how they correlate with perceived stress, objective strain, and performance. The results provide insight into how personality differently affects stress, strain, and performance.

Keywords: Technostress, Strain, Salivary Alpha-Amylase, Cortisol, Individual Differences, Social Desirability, Fear of Negative Evaluation, Worry

INTRODUCTION

Contemporary information technologies are pervasive in the workplace. When working properly, information technology streamlines work and improves efficiency of an organization. However, when information technology malfunctions, workers can find themselves in complete disarray, unable to perform. While our IT-reliant lifestyle has had a dramatic impact on business productivity it has also caused technology-induced stress, termed technostress. Formally defined, technostress is the stress that directly or indirectly results from using information and communication technologies (Tu, Wang, & Shu, 2005).

Researchers have suggested that the inconsistency of empirical findings with regards to stress is due to other researcher's failure to consider individual differences (Perrewe, 1987). It is no surprise that individuals differ dramatically with their response to external stimuli. However, it is less clear how stress occurs in an Information Technology context, especially while considering these individual differences. We contend that regardless of actual stress incurred within the body, some individuals are born with a personality that makes them more predisposed to admit to stress, while other personalities are more likely to avoid admitting to stress.

Overall, we know very little about how individual differences handle technostress either objectively, through stress hormones such as alpha-amylase, or perceptually by suggesting that workers are stressed.

Personality and Stress

This study argues that being stressed is not always feeling stressed, and that personality can cause individuals to over or underreact to techno-stressful situations. Therefore, this study examines the affects personal characteristics have on the stress process. Hence, we propose the following research question:

How does personality affect perceptual stress and objective strain?

More specifically, we seek to examine four specific personality characteristics that we feel have the most impact on the stress/strain relationship: locus of control, social desirability, fear of negative evaluation, and the propensity to worry. Therefore, we propose a more specific research question below that forms the basis of our research model.

How do Locus of Control, Social Desirability, Fear of Negative Evaluation, and the Propensity to Worry affect Perceptual Stress, Objective Strain, and Performance?

The manuscript proceeds as follows. First, we develop a model of technostress. Then, we test our hypotheses through an experiment that manipulates features of the ICT and the context to evaluate the stressor-strain relationship. Finally, we discuss our preliminary findings, methods, and implications for further study.

LITERATURE REVIEW

Rooted in Selye's (1956) seminal work on stress, the transactional perspective suggests that stress is not a factor of the individual nor the environment, but rather an embedded ongoing process that involves the individual transacting with his or her environment, making judgments, and coping with the issues that arise (Cary L. Cooper, Dewe, & O'Driscoll, 2001).

There are many models that draw on the transactional perspective of stress. In this study, we focus on the person-environment (P-E) fit model, which suggests that stress results from high demands or insufficient supplies to meet the person's needs (Ayyagari, Grover, & Purvis, 2011; Cary L. Cooper et al., 2001; Edwards, 1996). We examine the P-E fit model within the transactional perspective of stress for two reasons. First, one cannot ignore individual differences in the perception or appraisal of stress. Second, stress results from either a mismatch of one or both of two dimensions of the person with one or both of two dimensions of the environment: between abilities of a person and high demands or from the values of a person and insufficient supplies to meet the person's needs (Cary L. Cooper, 1998; Edwards, 1996; French, Caplan, & Van Harrison, 1982). Basically, this model accounts for personal characteristics, coping/control characteristics, and characteristics about environmental demands.

This study specifically looks at locus of control as the individual "control" characteristic and social desirability, fear of negative evaluation, and the propensity to worry as individual "personal" characteristics that can affect how stress is processed, felt, and received. Figure 1 depicts a model of the ICT-enabled stress and Table 1 defines its components.

Table 1. Construct Definitions

Construct	Definition
Locus of Control	Measures the extent to which individuals believe they can control events affecting them (Rotter, 1966).
Social Desirability	A bias that describes the tendency to respond in a manner that will be viewed favorably by others. It can take the form of over-reporting "good behavior" or under-reporting "bad", or undesirable behavior (Crowne & Marlowe, 1960).

Fear of Negative Evaluation	Pertains to the sense of dread associated with being evaluated unfavorably while anticipating in a social situation (Leary, 1983).
Propensity to Worry	A self-reported measure of pathological worry (Meyer, Miller, Metzger, & Borkovec, 1990).
Stress	The overall transactional stress process (Hans Selye, 1956; H. Selye, 1983; H. Selye, 1993).
Perceived Stress	The psychological responses made by individuals based on an environment, such as fatigue (Moore, 2000).
Objective Strain	The physiological responses made by individuals, as measured by salivary alpha-amylase (Granger et al., 2007; Harmon, Towe-Goodman, Fortunato, & Granger, 2008).

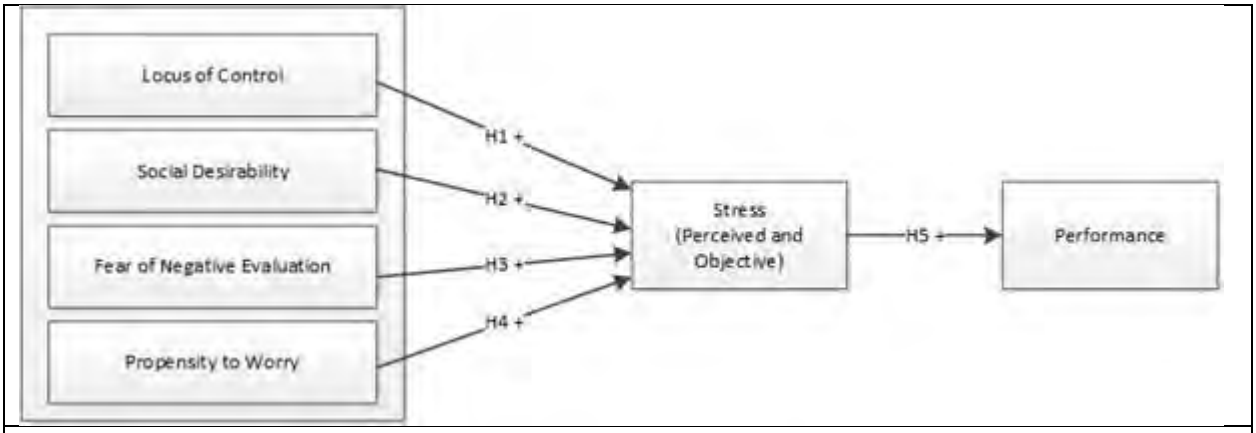

Figure 1. Research Model and Hypotheses

Internal Locus of Control

Many researchers have found that control characteristics, specifically dealing with a lack of control, can lead to stress (Daniels, 1994; Dwyer & Ganster, 1991; Fox, Dwyer, & Ganster, 1993; Kushnir & Melamed, 1991; Landsbergis, 1988; Perrewe, 1987; Perrewe & Ganster, 1989; Schaubroeck & Merritt, 1997; Wall, Jackson, Mullarkey, & Parker, 1996). Control has been defined in terms of personal control and locus of control, where personal control refers to an individual's' belief in his or her lack of ability to change the environment (Perrewe, 1987) and locus of control refers to people's beliefs about the extent they can control the events that influence their lives (Rotter, 1966).

Individuals who have a strong internal locus of control believe they are in charge of their own decisions and behavior. Therefore, individuals see themselves as the prime determinant of what happens in the environment (Rotter, 1966). Individuals with a strong external locus of control believe that their life is generally influenced by people outside of their control (Rahim & Psenicka, 1996). An individual with a high external locus of control believes in fate, luck, and powerful others as being in control of their outcome (Mirels, 1970). Locus of control is a cognitive phenomenon, where regardless of the level of objective personal control, predisposed perceptions and beliefs will determine the level of felt control.

In a meta-analysis on autonomy in the workplace, high levels of control have been associated with high levels of job satisfaction, commitment, involvement, performance, and motivation and low levels of emotional distress, role stress, absenteeism, turnover, and physical symptoms (Spector, 1986). Thus, the

lack personal control in combination with an external locus of control can lead to strain. Therefore, the lack of control is more likely to influence stress when locus of control is external (Daniels, 1994). Therefore, we propose the following hypothesis:

Hypothesis 1. Individuals with an external locus of control will report perceptual stress and objective strain.

Social Desirability

Social Desirability refers to a bias that describes the tendency to respond in a manner that will be viewed favorably by others. It can take the form of over-reporting "good behavior" or under-reporting "bad", or undesirable behavior (Crowne & Marlowe, 1960). Many researchers find social desirability as a major confound of psychology research, specifically dealing with varying personalities (Graziano & Tobin, 2002; Smith & Ellingson, 2002). Researchers suggest that social desirability could reduce data quality by causing participants to alter their responses based on how they think they should respond (Stodel, 2015).

In this study, we examine social desirability as a tendency to lie whereas individuals may report more/less stress based on their level of social desirability. Some researchers include social desirability as a part of impression management "lie scales" as a response bias and compares it to the idea of self-deception (Stodel, 2015; Uziel, 2014). The higher an individual is on social desirability, the more likely they are to adjust their responses to try to fit in.

In psychology research, assessments of perceptual stress have been shown to be influenced by social desirability, whereas social desirability caused individuals to report higher stress (Sato & Kawahara, 2012). However, little research has looking into technology oriented stress or how it relates to objective strain. Therefore, based on this research, we propose the following hypothesis:

Hypothesis 2. Individuals high on social desirability will report perceptual stress and objective strain.

Fear of Negative Evaluation

Fear of Negative Evaluation pertains to "the sense of dread associated with being evaluated unfavorably while anticipating in a social situation" (Leary, 1983). Studies show that Fear of Negative Evaluation is closely related to measures of social-evaluative anxiety (Watson & Friend, 1969) and that social anxiety is generally caused by one's fear of negative evaluation (Clark & Wells, 1995; Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992). Fear of negative evaluation and social anxiety are often used interchangeable due to their cognitive nature; however, we focus on fear of negative evaluation because it is a more specific personality characteristic that explains how individuals adapt their answer based on how they fear others will respond.

Fear of Negative Evaluation is generally viewed as the precursor to other fears and anxiety (Reiss & McNally, 1985). These fears and anxiety could be linked to the admission of stress; however, little research has evaluated the impact fear of negative evaluation has specifically on stress and strain, especially in a technology oriented environment. Therefore, we propose the following hypothesis.

Hypothesis 3. Individuals high on Fear of Negative Evaluation will report perceptual stress and objective strain.

Propensity of Worry

The propensity to worry is a self-reported measure of pathological worry (Meyer et al. 1990). While there are many types of worry, we focus on the worry individuals exhibit as a personality/lifestyle trait. Some individuals are considered to be more of a *worrier* than others.

These worriers exhibit more negative emotions than others thinking about things that may or may not be important. Generally, worry is considered a negative emotion which can be caused by anxiety and lessened by self-esteem (Kelly, 2014). Researchers have related pathological worry to other personality types and found that worry is positively correlated to introversion and feeling Jungian typologies (Ragozzino & Kelly, 2011).

While worrying has been shown to cause perceived stress (Kelly, 2008; Kelly & Daughtry, 2011), physiological researchers suggest that worrying may actually occur from cortisol reactions in the body (Robinson, Ode, & Hilmert, 2014). This change in causality is partly due to the different handling as a trait or a state. Overall, researchers tend to ignore how the propensity to worry (as a trait) plays a role in motivating individuals to perform under stress. Little research has also looked into the physiological reaction to people more prone to worrying. Therefore, we propose the following hypothesis:

Hypothesis 4. Individuals who have a high propensity to worry will report perceptual stress and objective strain.

Stress, Strain, and Performance

ICTs‘ infusion in the workplace can lead to multiple outcomes ranging from positive outcomes (i.e., quicker task performance) to negative outcomes (i.e., higher levels of demand and stress). While researchers agree a curvilinear relationship is present between stress and performance, empirical evaluation on this relationship is limited. Individuals who experience no stress can be inattentive, bored, and have poor performance. Individuals who experience high stress can be overexerted, which leads to clouded judgement and poorer performance.

We hypothesize that individuals who experience moderate amounts of stress will perform better and be more satisfied with their performance. Additionally, increased performance will positively affect how satisfied they are with how they did. Hence, we propose the following hypothesis:

Hypothesis 5. Perceived stress and objective strain affects performance.

METHODS

Construct Measures

All constructs were measured using multi-item scales.

Locus of control was measured using items from Rotter (1966). We used the shortened version consisting of 13 items where they choose the answer that best fits them (i.e., *Many of the unhappy things in people's lives are partly due to bad luck.* versus *People's misfortunes result from the mistakes they make.*
Social desirability was measured using 33 items adapted from Crowne and Marlowe (1960). Participants reported whether they thought the statement in question was true or false (i.e., *Before voting I thoroughly investigate the qualifications of all the candidates).*

Fear of Negative Evaluation was measured using 12 items from Leary (1983). Participants reported how characteristic each statement was to them on a 5 point Likert scale (i.e., *I worry about what other people will think of me even when I know it doesn't make any difference. Not at all characteristic of me(1) to Very Characteristic of me(5)).*

The propensity to worry was measured using 16 items from Meyer et al. (1990). Participants reported how typical statements were of them using a 5 point Likert scale (i.e., *If I do not have enough time to do everything, I do not worry about it. Not at all typical of me(1) to Very typical of me(5)).*

Perceived stress was measured using both Cohen's (1983) PSS-10 scale and Moore's (2000) scale of workplace stress. All items were answered on a 5 point Likert scale. The PSS-10 scale asked how often they felt certain ways while the workplace stress scale asked them how much they agreed with the statement. Items ranged from asking questions like how often they were "upset because of something that happened unexpectedly? To whether they were "drained mentally".

Objective strain was gathered by collecting salivary alpha-amylase, a stress induced hormone (Harmon et. al., 2008; Granger et. al., 2007).

Perceived performance was measured objectively by scoring how many math problems they got correct, and by asking how they think they did on a 3 item, 5 point Likert scale (Poor(1) to Good(5)).

EXPERIMENTAL DESIGN

We used experimental design to test our hypotheses. It took 30 minutes to complete an experiment of technology-induced stress and to gather survey items and physiological measures from participants. Each person was administered the experiment individually. Participants were required to meet two qualifications prior to signing up: experience using ICTs regularly at home or at work as well as no cardiovascular problems. See Figure 2 for details on our experiment. The readings labeled below (both baseline and post-experiment) refer to the collection of salivary alpha-amylase).

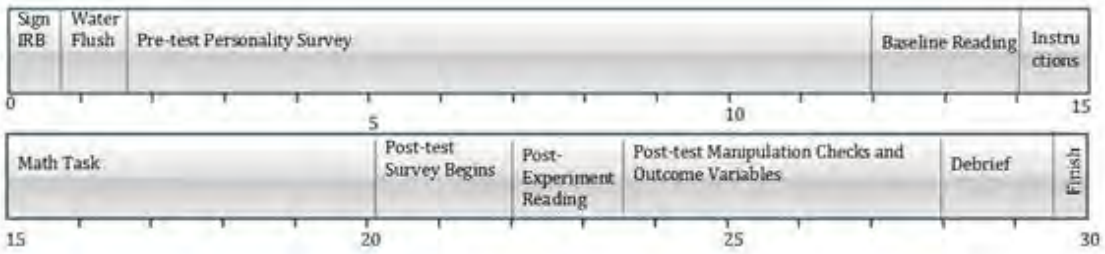

Figure 2. Experiment Protocol

Students began by being informed of their consent and accepting the IRB on SurveyMonkey.com. Students swished water for 30 seconds to prevent contaminants entering the samples, termed a water flush. The baseline measure of salivary alpha-amylase was taken 5 minutes after the water flush. After baseline measures were taken, the participant was given the instruction sheet which also outlined the incentives.

Survey questions were answered while the participants were waiting on the math portion to start. That survey collected personality measures of locus of control, social desirability, fear of negative evaluation,

and propensity to worry. Upon starting the survey, the participants received a unique id from the principal investigator, termed simulation ID.

The *IT Meltdown Task* was designed to be stressful, but not more so than an individual would receive in any given workday. The researchers designed a simulation where the participant answers as many math questions as possible, while dealing with preprogrammed malfunctions and loading screens. The more questions the participant answered correctly, the more incentives he or she gets a chance to receive. The math portion only contained basic addition questions (a random 3-digit number with a second random 3-digit number i.e., 188 + 492).

After the IT simulation, participants answered post-test questions and had a second salivary reading, including perceived stress, satisfaction, performance, math aptitude, and salivary controls. Salivary controls included the intake of alcohol, caffeine, dairy, tobacco, and the recency of a major meal. Participants were administered salivettes that were purchased from Salimetrics, a salivary assay company. Salivettes are cotton-like swabs that participants keep in the side of their cheek for 2 minutes. These exact tools have been used before in IT research and are considered non-invasive by research. They will spit the cotton swab back into the test tube for processing without even touching the specimen.

Processing Samples

Assay kits were purchased from Salimetrics and processed in house. Once samples were collected, they were immediately frozen at -80◦Celsius. Each sample is identified only by a simulation number for both pretest and posttest measures. Duplicate measures were analyzed for each sample to confirm our protocol. In order to analyze the alpha-amylase inside the participant's saliva we followed a detailed protocol. That protocol is available to review at https://www.salimetrics.com/assets/documents/1-1902.pdf. This protocol included collecting duplicate readings for each sample at both the pre- and post-test collection time, giving us four readings per participant. These duplicate measures were each measured in the plate reader at two points in time, 1 minute and 3 minutes. We manually calculated the difference between those two numbers after the machine confirmed the raw readings. The duplicate scores confirmed that our protocol was correct by showing a similar reading between the measures. After analyzing the samples, we averaged the two scores and multiplied that score by 328. Generally, salivary alpha-amylase scores should fall between 3.1μ/ml and 423μ/ml, with an average of 92.4μ/ml.

Once each score was calculated for both the pretest and the posttest, an overall change in objective strain measure was calculated by subtracting the pretest measure from the posttest measure and dividing that score by the posttest measure. These numbers would generally go up from the pretest to the posttest and give us a positive final score if the participants were objectively strained by the experiment. Negative scores mean that the participant actually lowered their level of strain during the experiment. After these calculations, these final scores should fall between -1 and 1.

PRELIMINARY RESULTS

We received pilot data from 21 students at a small liberal arts institution. With this amount of data, we were able to check for the reliability and validity of our items, and run simple correlation analysis. It should be noted that with such a small sample size, type II error is less likely. Instead high Cronbach alpha scores and significant correlations are more likely to stay significant as we get more power from

additional participants. Because of the low power, more data is required before regressions can yield useful insights into our hypotheses.

From our pilot data, we calculated the descriptive statistics (See Table 2). The average age of participants was 20 and 52.38% of our subjects were male. 70.43% of our participants were Caucasian/non-Hispanic, which is aligned with the general population of the college.

Table 2. Descriptive Statistics

	Mean	Standard Deviation	Cronbach's Alpha	Number of Items
Locus of Control*	.5206	.1957	.711	12**
Social Desirability	.5194	.127	.626	30***
Fear of Negative Evaluation	2.78	0.40	.903	12
Propensity to Worry	2.88	0.43	.929	15****
Perceived Stress	2.20	0.30	.934	15
Objective Strain	Time 1: 98.62 Time 2: 103.23	Time 1: 89.99 Time 2: 70.82	N/A	N/A
Performance	# Correct: 16.80 Accuracy: .47	# Correct: 5.23 Accuracy: .12	N/A	N/A

*LOC and SD were dichotomous: External/Internal and True/False
**Deleted 1 item, LOC10R, due to low reliability
***Deleted 3 items, SD12R, SD17, and SD31, due to low reliability
****Deleted 1 item, W15, due to low reliability

The correlation analysis yielded some interesting results (See Table 3 for details). Significant correlations are tagged below with an asterisk and a p-value less than .05. Women were less satisfied with how they performed (-.466; p-value <.05), perceived more stress from the experiment (.492; p-value <.05), and were more frustrated by the experiment (.533; p-value; <.05). There was no difference in performance between genders (p-value not significant).

Participants who feared negative evaluation were more likely to report stress (.475 p-value; <.05), but not necessarily objectively strained (p-value not significant). People who worried were more likely to feel stress (.616; p-value <.05) and more frustrated (.507; p-value <.05). Those who worried were also more likely to fear negative evaluation from others (.582; p-value <.05).

Internal Locus of Controls were more frustrated (-.549; p-value <.05), but not necessarily more stressed (p-value not significant).

We calculated both the number of correct answers and the accuracy. The number answered is correlated to both accuracy (.528; p-value <.05) and the amount of effort they put in (.470; p-value <.05), but it is not correlated to our stress variables. More data is needed to make more conclusions on our specific hypotheses.

Table 3. Pearson Correlations Results

		Perceived Stress	Objective Strain	Locus of Control	Social Desirability	Fear of Negative Evaluation	Propensity to Worry	Gender	Effort	Frustration
Objective Strain	Correlation	-.492								
	p-value	.087								

Personality and Stress

Locus of Control	Correlation	-.381	.014							
	p-value	.097	.963							
Social Desirability	Correlation	-.011	.023	-.394						
	p-value	.964	.939	.085						
Fear of Negative Evaluation	Correlation	.475*	.125	-.194	.157					
	p-value	.034	.671	.412	.497					
Propensity to Worry	Correlation	.616*	-.258	-.390	.302	.582*				
	p-value	.004	.374	.089	.183	.006				
Gender	Correlation	.492*	.187	-.136	-.216	.297	.425			
	p-value	.028	.523	.566	.348	.191	.055			
Effort	Correlation	.173	.042	-.358	.167	.328	.048	-.045		
	p-value	.467	.887	.122	.469	.147	.837	.845		
Frustration	Correlation	.727*	-.277	-.549	.085	.418	.507*	.533*	.387	
	p-value	.000	.338	.012	.714	.059	.019	.013	.083	
Satisfied	Correlation	-.673*	.236	.271	.166	-.258	-.217	-.466*	.093	-.575*
	p-value	.001	.416	.248	.473	.259	.345	.033	.688	.006

CONCLUSIONS AND PREPARATION FOR THE FUTURE

After the careful analysis of the pilot test, in Fall 2016, we simplified the math task and included more meltdowns to focus on the technological interruption. Instead of asking 3-digit addition questions, we asked 2-digit questions (i.e., 12+82) and have added additional questions and more loading/error screens. Many of the participants remarked that adding 3-digit numbers was very difficult, and perhaps an additional cause of stress outside the loading screens and breakdowns. As such, we have simplified our experiment and begun testing with a new group of participants.

We have also looked closely at our survey questionnaires. Some items needed clarification and needed to be altered slightly. We also took a close look at the additional personality characteristics we collected but did not present here. The Big 5 personality test will be included the next iteration, including extraversion, neuroticism, agreeableness, conscientiousness, and openness to experience.

We are actively administering our experiment and will present this new data at South East DSI 2016.

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Multi-Objective Preventive Maintenance and Replacement Scheduling in a Manufacturing System using Goal Programming

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Abstract

This research presents a new multi-objective nonlinear mixed-integer optimization model to determine Pareto-optimal preventive maintenance and replacement schedules for a repairable multi-workstation manufacturing system with increasing rate of occurrence of failure. The operational planning horizon is segmented into discrete and equally-sized periods and in each period three possible maintenance actions (repair, replacement, or do nothing) have been considered for each workstation. The optimal maintenance decisions for each workstation in each period are investigated such that the objectives and the requirements of the system can be achieved. Total operational costs, overall reliability and the system availability are incorporated as the objective functions and the multi-objective model is solved using a hybrid Monte Carlo simulation and goal programming procedure to obtain set of non-dominated schedules. The effectiveness and feasibility of the proposed solution methodology are demonstrated in a manufacturing setting and the computational performance of method in obtaining Pareto-optimal solutions is evaluated. Such a modeling approach and the proposed solution algorithm could be useful for maintenance planners and engineers tasked with the problem of developing optimal maintenance plans for complex productions systems.

NO – BUSINESS INTELLIGENCE IS NOT AN OXYMORON OR A BIG DATA TECHNIQUE

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ABSTRACT

Business education current practice prepares students for analysis with tools such as Strengths, Weaknesses, Opportunity, and Threats (SWOT Analysis). Data Analytics and Predictive Modeling have become popular, and now we hear about Data Science with the advent of big data. As faculty show students how to help business organizations solve real-world problems with these advanced analysis tools, they need to understand how to integrate the softer side of Business Intelligence into business analysis practice. These softer skills include Knowledge from Education, Practical IQ, Emotional IQ and Interpersonal IQ. Taken together they define Business Intelligence which is highly useful in both academic assignments like internships and on the job after graduation.

BACKGROUND

Dion, Berschid, and Walster [6] launched a line of research with their thesis that "what is beautiful is good" that has been applied to everything from reviewing resumes [14], to cooperation on tasks [16]. What can transcend physical attractiveness and personality is Business Intelligence. Without business intelligence, graduates are unlikely to be highly successful no matter how attractive they are, how much content knowledge they have, or how many technical skills they acquire in pursuing a business degree. This approach to developing business intelligence has been successfully tried in quantitatively oriented degrees such as statistics [22] which indicates its potential application in business education. In fact, the past President of the American Statistical Association, Sastry Pantula has argued that statisticians need soft skills describing Business Intelligence saying the following [12]:

> "To succeed in our careers, we need both hard skills and soft skills. There is no doubt that all our jobs require us to have a strong foundation in statistical theory and methodology and excellent computational skills to manage massive data. Soft skills are not a cover-up for the lack of hard skills; we must have and show our expertise in our field. However, hard skills by themselves are not enough. Soft skills help us work in teams, communicate with other scientists, aid management, and move up the ladder through leadership."

This paper is directed at showing how Business Intelligence is based on four kinds of IQ that are independent of physical attractiveness, personality, quantitative abilities, and technical skills:

1. Content IQ
2. Practical IQ
3. Emotional IQ
4. Social IQ

The cluster of intelligence factors appears in Figure 1 below:

Educational IQ

Fluid reasoning (FR) is the ability to solve problems in novel circumstances. Fluid reasoning is considered by its originator [3] to be independent of acquired knowledge. It is considered essential for cognitive development [11] and helps us to acquire other abilities [1] [2] [3]. Fluid reasoning, in childhood, foreshadows success in school, university, and work where cognitive skills are involved [12]. In addition to this line of research, Clouston, Kuh, Herd, Elliott, Richards, and Hofer [5] followed international birth cohorts to show that education has a direct causal and lasting benefit on cognitive development. Cognitive development was measured in a variety of ways including the change in mathematics and reading comprehension in addition to other measures from age 15 to 53. These authors found that having a university education is positively correlated with higher fluid reasoning in adulthood. Those authors concluded that differences in adult fluid reasoning are at least partially due to educational experiences after adolescence.

Gensowski, Heckman, and Savelyev [8] estimated the internal rate of return (IRR) for education for men and women included in the Terman sample, a 70-year long prospective cohort study of high-ability individuals. This analysis showed the IRR for obtaining a bachelor's degree over a high school diploma is 11.1%, and for a doctoral degree over a bachelor's degree it is 6.7%. These results are unique because they highlight the returns to high-ability and high-education individuals, who are not well-represented in typical data sets. The results also show IQ is rewarded in the labor market.

Practical IQ

Analytical and creative business knowledge and skills define Practical IQ [19]. Those with Practical IQ know how to collect, prepare, process, and interpret the output of business analysis tools such as SWOT and TOWS. Business consultants convert results of these analytical techniques into information that can be used to improve the operations and strategic position of a business. One author [23] has even offered 54 different tools and techniques business consultants can use as a resource list to call on.

Emotional IQ

The ability to identify, assess, and control their own emotions when others have trouble understanding business problems and solutions is a very important skill [9]. Emotional IQ has components as simple as good listening skills and as complex as managing an irate client. Emotional self-control defines Emotional IQ, a second element to Business Intelligence. This capability means a good business consultant is confident but not arrogant. Listens actively by reflecting what a client says to gain complete understanding. Having a PhD from a top Business School like Wharton or Harvard Business School is nice, but those with Emotional IQ will rely more on the ability to get others to understand business problems and potential solutions than what they learned in business school. Emotional IQ also means being confident is better than simply appearing confident. Being truly confident makes it a lot easier for other people to trust a business consultant with help in solving business problems and running their organization. Being truly confident and having Emotional IQ also means being 'objective.' Neuroscience has shown that in the area of analysis versus emotions, many decisions can be improved by having negative emotions recognized and kept in control [21] before crucial decisions are made. Those who have command and control over their emotions have high Emotional IQ.

Interpersonal IQ

The capacity to quickly establish rapport and effectively navigate and negotiate complex social relationships and environments defines what he labels as Social IQ. As described earlier, emotional intelligence deals with managing our personal emotional state, and is contrasted with social intelligence as dealing with managing interpersonal interactions and relationships to positively influence others. Social IQ enables business consultants to establish a relationship and serve clients who are not knowledgeable in organizational development and dynamics. Many examples of the value of Social IQ can be found in Daniel Goleman's work [10], and the foundation of Social IQ is anchored in mirroring neurons in the brain. This approach to Social IQ is based on neuroscience which describes the basis of empathy as the ability to both feel the emotional experiences of others and understand their situation from a rational point of view.

Business Intelligence

Henry Cloud [4] has described a predisposition to action resulting from these four types of IQ. It is contended here that the following six characteristics define functional Business Intelligence as:

1. The ability to gain the complete trust of others.
2. Seeing reality without blind-spots.
3. Working in a way that produces outcomes that are expected based on their abilities and available resources.
4. Dealing effectively with problem people, negative situations, obstacles, failures, setbacks, and losses.
5. Creating growth in themselves, their organizations, their clients, and anything else they touch.
6. Transcending their own interests and dedicating themselves to a larger purpose or mission.

DISCUSSION

It is argued here that Business Intelligence comes from developing Educational, Practical, Emotional, and Interpersonal Intelligence skills and abilities. It begins with the ability to understand why someone wants to engage a business consultant in the first place. The top 10 reasons organizations hire business consultants were identified in a recent survey [7] and include the following items. A consultant may be hired to:

1. Provide his or her unique expertise. This is where it pays to not only be really good in the technical aspects of business consulting, but to have some type of track record that speaks for itself.
2. Identify problems. Sometimes employees are too close to a problem inside an organization to identify it. That situation is often helped by a naïve outside view.
3. Supplement the staff. Sometimes an organization discovers that it can save thousands of dollars by hiring consultants when they are needed, rather than hiring full-time employees. Organizations sometimes realize they save additional money by not having to pay benefits for consultants they hire. Even though a consultant's fees are generally higher than an employee's salary, over a given time period, it simply makes good financial sense to hire a consultant.
4. Act as a catalyst. In a typical organization few people like change. When change is needed, a consultant may be brought in to 'get the ball rolling.' In other words, the consultant can do things without worrying about the organization's culture, employee morale, or other issues that get in the way when an organization is trying to create change.
5. Provide much-needed objectivity. Who else is more qualified to identify a problem than a consultant? A good consultant provides an objective, fresh viewpoint--without worrying about what people in the organization might think about the results and how they were achieved.
6. Teach or train employees. These days if you are a business consultant who can show employees how to master a new business aspect like social media or big data analysis, then the telephone probably will not stop ringing for a while. A consultant may be asked to teach employees any number of different skills. A consultant must be willing to keep up with new discoveries in their field of expertise--and be ready to teach new clients how to stay competitive.
7. Do the 'dirty work.' When cuts have to be made or only one point of view can be accepted, someone's feelings are going to be hurt or someone's 'baby' must be declared 'ugly.' When the available information suggests a product should be taken out of production, when years of R&D have been invested in a product that the market just does not want or need, or when the boss's favorite ad is not working, someone has to tell the truth. Managing that conflict is a key skill.
8. Bring new life to an organization. If you are good at coming up with a new business model that works, then you will not have any trouble finding clients. Sometimes the problem is not really a problem, but an opportunity and a good business consultant can find a way of analyzing and displaying the information that shows a viable opportunity that not only solves a problem, but leads to growth.
9. Create a new business. There are consultants who have become experts in this field. Not everyone has the ability to conceive an idea, support it with data and expert analysis, and then develop and sell a plan for the future. If students can do all of that, they will be successful.
10. Influence other people. Asking the question, 'Do you see yourself as a sales person?,' must be answered by the business consultant. Whether students realize it or not, they are always selling. Selling ideas and results of business analysis is a key part of being a business consultant since many business outcomes are grey rather than black and white.

An Example

The Myrtle Beach Area Chamber of Commerce requested help in determining new ways to attract visitors to the Myrtle Beach. A three-person student team was selected from a Marketing Research class to

undertake the project under the guidance of the author. These students enthusiastically accepted the invitation.

The process included meetings with the CEO and Marketing Research Department of the Chamber of Commerce and business leaders in the area. From those meetings, the students developed a plan of action. The objective throughout this project was to discover what would entice people to travel to the Myrtle Beach area during the off-season. They submitted a proposal to the CEO and created a milestone schedule to finish the project before the end of the semester. The students displayed Social and Emotional Intelligence in the process of working with the Chamber of Commerce to identify the problem, creating a plan to solve the problem, and selling the plan to the CEO and Marketing Research Department of the Chamber of Commerce.

The field research phase included qualitative methods used to explore questions pertaining to: hotel accommodations, length of stay, attractions or events, and price. A quantitative survey was then designed and implemented to determine how strongly potential visitors felt about these issues. A multi-method approach was used involving face-to-face, telephone, and internet methods. In all cases a Self-Administered Questionnaire was employed. The students analyzed data using Excel Data Analysis ToolPak. They then created tables, graphs, and other material for a formal written report and a PowerPoint presentation. Their interpretation of the analysis indicated the most important issues in the quantitative findings were age and price. The age group 24-39 was found to be the most frequent and most price sensitive tourists visiting the Myrtle Beach area. These findings led them to conclude that the age group 24-39 is the most important segment for future marketing using a price bundling strategy. The field and reporting phases showcased their Practical Intelligence as well as Social and Emotional Intelligence.

The student team presented the project in two venues: 1) at a dinner meeting of members of the Chamber of Commerce, and 2) at a special presentation of undergraduate and graduate student research projects for the Wall College Board of Visitors. In both cases, the team, the project, and its recommendations were well received. Three of the recommendations were adopted as an action plan by the Chamber of Commerce.

Finally, as a tribute to the students' Business Intelligence, the Chamber CEO wrote an extraordinarily complementary letter to the President of Coastal Carolina University and donated $2,000 to the Marketing Club which has been used to support the students' Club activities.

CONCLUSIONS AND IMPLICATIONS

On the employer side, the approach of looking for candidates with Business Intelligence has been used in employee selection as outlined by Livens, Chan, In Farr, and Tippins in the Handbook of Employee Selection [15]. On the business consulting side, internal and external clients often do not know about such tools and techniques such as SWOT and TOWS. Consultants with high Business Intelligence are able to have an understanding of both their client as people and their client's opportunity or problem. That dual understanding plus a business analysis done by a consultant high in Business Intelligence can lead to effective change and sustainability of the business. Employees in a business needing this kind of assistance also need to have the problem/opportunity and recommendations for action explained in 'street language' which they can understand and which they can then use and communicate to others in the organization.

In summary, students who exhibit Business Intelligence are:

1. Able to quickly establish trust and rapport.
2. Exude confidence born of experience.
3. Able to concentrate on the client's situation and never procrastinate.
4. Exhibit understanding all factors that affect the client business.
5. Be as committed to the client business as the people who work in it.
6. Be effective communicators in very specific rather than vague ways.
7. Be capable of delivering results that have a major impact on the success of the client business thereby justifying their very existence.

Most students do not come to college with these skills. Teaching business students the soft skills and abilities defining Business Intelligence exhibited by effective consultants early in their business program of study is a good way to practice what Randy Pausch [18] calls 'head fake learning,' or learning about something without being aware you are being taught. Business Intelligence is a special case of head fake learning that requires the right approach. The student project described here is an example of real world business consulting by students involving head fake learning in tourism marketing. It shows how all three types of IQ are developed, needed, and how to use them.

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No One Is as Smart as Everyone – A Japanese Proverb
The Story of a High-Performing Work Team
A Case Study

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Abstract

In 1998 a rapidly growing manufacturing company hired a new Vice President of Operations. While his responsibilities were very traditional, as one of his "duties as assigned" he was privileged to lead a work team that promoted and installed what was to be called the "Employee Ownership Program". This case study is written from the perspective of the team leader and done after interviewing all the team members and reviewing the documentation supporting the team's activities.

A CASE STUDY OF A HIGH-PERFORMING WORK TEAM

Teams are the leaders of the 21st century. Almost nothing grows in the direction of simplicity; chaos is necessary to new creative ordering (Wheatley, 2000, p. 13). In short, the world is too complex to think that one person can make sense of the chaos that Margaret Wheatley refers to in her book – "*Leadership and the new science: Discovering order in a chaotic world"*. The need for collaboration, teamwork, and an understanding of the unique perspectives of our progressively more diverse society is increasingly critical to success. Leadership is not a solo act; it is a team effort.

This case study looks at the critical events and the team structure that created a high-performing work team. It is of interest because of the team's success, the unique events involved, the creative people who were on the team, and the characteristics that defined the team and generated its powerful work environment. This case study is meant to help answer how and why this team was a success (Feagin, Orum, & Sjoberg, 1991, p. 121).

Methods

The story is auto-ethnographic, an autobiographical genre of writing and research that displays multiple layers of consciousness, connecting the personal to the cultural (Humphreys, 2005, p. 840). Because the story is auto-ethnographic, it is constructed from interpretations of the personal observations of the team leader, information gathered from interviews with the team members as well as the executive sponsor and study of substantial documentation supporting the project.

Clarity of Purpose

Larson and LaFasto (1989) emphasize the crucial need for clarity concerning goals and principles surrounding the establishment of successful teams. They write:

> *Our sample was relatively small (31 interviews covering more than 75 teams), but very diverse. Therefore, it was surprising to find that in every case, without exception, when an effectively functioning team was identified, it was described by the respondent as having a clear understanding of its objective. (p. 27)*

The seminal and defining meeting for this project occurred shortly after the team members were identified. This session, the first of many organizational meetings, was attended by the chief financial officer (CFO) and the chief legal counsel as well as three members of the team. They discussed the challenges ahead of them and the resources needed to complete the project. Although the team members had outlined the goals and objectives several times in our casual conversations, and generally agreed on some of the details, during this meeting the CFO made sure we understood his instructions. We had one year to publicly register the company and two years to create, develop and sell the program to the 6,000 employees of the Company. In true Nature Manufacturing fashion, he left it up to us to organize ourselves and bring in additional team members that might be needed, with one caveat: Any team we built would be a "virtual team." By "virtual team," he meant that everyone on the team would report to the team leader via a dotted line and would be drawn from other parts of the company. This requirement really meant that the team members would retain their primary duties and would effectively be part-time members of the team working on this project.

After delivering these instructions, he left the room for another meeting, leaving the three-team members with the chief legal counsel to contemplate how we could

successfully complete such a daunting project with part-time employees. While everyone wanted to make a good impression on their new employer, they were all experienced enough to know what SEC registration really meant and the challenges they had in front of them. Although they had the support of our organization, the ability to pull in the right people to make the team a success, seemingly a clear understanding of the goals and objectives – they were still concerned.

Context

> *Broadly, organization environment is the psychological atmosphere that emerges from the way an organization conducts itself. The environment is never neutral. It has compelling content. It shapes our ideas and perspectives. It can promote openness or silence. It can encourage risk taking or risk aversion. It can allow for differences or require sameness.– Frank LaFasto and Carl Larson, When Teams Work Best, 2001, p. 158*

Supportive Organizational Environment

Often companies have organizational structures that overwhelm the best of intentions (LaFasto & Larson, 2001, p. 157) and management cultures that do not support teams – but "group effectiveness" (Katzenbach & Smith, 2003, p. xiv). In the United States, this is especially true, given the emphasis on strong personal and political freedoms which are counter to building a team culture (Manz & Sims, 1993, p. 17). While some refer to it as the "fuzzy factor" (Larson & LaFasto, 1989; p. 109), the supportive atmosphere of the organization was critical to the success of the employee-ownership team.

Nature manufacturing is a 50-year-old company that makes plumbing products and tools. The original founders, rich in technical knowledge, dialogued about their plans to build the company while severing as privates in the various theaters of WWII. Through

a series of letters and discussions the three partners created a plan to develop a business with creative, innovative people that had a strong sense of values.

Believing that culture was critical to the development and success of the company the original owners focused on it, constantly referring to culture in speeches and internal communications. In addition they insisted that it be discussed as part of any training programs the employees were sent to. The drive to develop a strong culture eventually led to the company motto: “Do good work, have fun, and make money.”

As part of the celebrated culture the company always believed that sharing the wealth was critical to the success of the firm. The philosophy was simple; given that the employees create the profits, a large part of that wealth needs to be returned to the them – in this case via increase in the value of the stock. Another way of understanding this concept is that they are building a company where what is good for the shareholders, is good for the company and good for the employees – everyone wins.

In support of employee ownership there is a growing and substantial body of research that builds on this idea. In the book *In the Company of Owners* (Blasi, Kruse, & Bernstein, 2003) the authors report that “there is compelling evidence that broad-based employee ownership does in fact produce more value for shareholders” (p. xi). Blasi goes on to examine many facets of broad-based employee ownership, arguing that it creates a focus on long-term corporate stability and a less autocratic corporation that is far less likely to breed executive malfeasance (p. xv). To quote Henry Ford, “No one is apathetic, except those in pursuit of someone else’s goals.” At Nature Manufacturing having employees own a large part of the company was critical to their innovative and creative success and a way to maintain the collaborative culture.

With the Company growing rapidly and on sound financial footing, several senior officers were hired to bring broader experiences to the business and to help explore ways to expand and develop the culture of employee ownership. Several of these new hires became members of this high performing team and committed to the concept of employee ownership.

The Team

> *A team is a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable. — Jon Katzenback and Douglas K. Smith, The Wisdom of Teams, 2003, p. 158*

A successful team begins with the right people (LaFasto & Larson, 2001, p. 1). In the survey Larson and LaFasto (1989) present in *Teamwork: What Must Go Right, What Can Go Wrong*, the factor designated as the most critical determinate of success was choosing the right team members (p. 59). In the end, a team's performance is defined by both individual efforts and collective work-products, and the first step in that process is choosing technically competent people.

There were six members of the original team that designed and installed the program. Each came to the team with unique technical expertise and insights into the organization. Four members of the team were hired just prior to beginning the project and two had been with the company for a number of years, one for 12 years, and the other for more than 25 years. They also represented different departments of the organization, including Treasury, Accounting, Legal, Human Resources, and Information Technology.

Another member of our team rarely attended our meetings but was critical to success: an executive vice-president of the company. He reports directly to the chairman

and was a member of the Executive Leadership Team, which consists of the chairman and presidents of the three major operating groups.

The executive sponsor selected the team members entirely for technical reasons; we needed an SEC-qualified accountant, an attorney, and a finance person to lead the project. His multiple years of experience with publicly traded companies and work with Wall Street played a crucial role in his selection of team members. He knew what critical skills were needed to complete the project (Larson & LaFasto, 1989, p. 62). Without this technical expertise, it would have difficult to bring this project to a successful conclusion.

Team Leader

The role of the leader in the small group tends to be exaggerated (Burns, 1979, p. 290). There is a traditional leadership theory that says the appointed leader is a legitimate authority figure and acts like the boss, but it does not apply to the unique situation of a self-managed team (Manz & Sims, 1993, p. 55). Team leaders genuinely believe they do not have all the answers (Katzenbach & Smith, 2003, p. 131).

Sometime during this first meeting, the Operations Manager volunteered to be the team leader. Although no one remembers how or why this happened, it turned out to be a unique choice. Since, according to LaFasto and Larson (2001) in their book *When Teams Work Best*, "team problem solving is not harmony, but constructive integration of diverse perspectives" (p. 66), the VP Operations generalist background played an important role in resolving disputes and negotiating between team members.

The selection as leader also turned out to be a good choice because of his passion for the project. While he had no previous experience with employee ownership, over time he began to understand what a powerful tool this structure could be in developing and

growing a company. The concept that those who created the value (the employees) would receive the value created (increase in share price) simply began to make sense to him. While everyone eventually felt that a spike in profits could be attributed to the Employee Ownership Program, the immediate success showed up in an annual employee survey which reported that employees felt good about the products delivered and enjoyed working at Nature. They also reported that they were very optimistic about the company's future.

The VP Operations leadership position was also unusual in other ways. While he set the agenda, managed the budget, and took primary responsibility for keeping our executive sponsor up to date, it often seemed in the meetings that the leadership position was transferred from one member to another. If we faced a significant accounting issue, the accountant would take the lead; if we had a significant legal issue, the lawyer would take over, and, for a period of several weeks when we were building the technology that supported our effort, the IT expert was the leader.

While all considered him the formal leader and allowed him latitude to see the project through to completion**,** he was not a conventional leader, but rather what Manz and Sims (1993) describe as a *coordinator* (p.55), a person who creates an environment of trust and confidence so that the team members can collectively move the project forward. I was not the boss in any traditional sense.

Organizing the Team

At the broadest level, processes are the nervous system of an organization, the location where the talent, tasks, and information are used to produce an outcome (LaFasto & Larson, 2001, p. 175). When teams first come together, ground rules,

policies, and norms are created to govern the working environment (Hoy, Van Eynde, & Van Eynde, 1997, p. 103). High-performing teams develop a commitment to working relationships in which they agree on who will do particular jobs, set schedules, and determine how team membership is earned (Bolman & Deal, 2003, p. 105).

While our executive sponsor had chosen the team for their technical expertise, he had no idea how they would "jell" as a team. How would they plan and organize themselves; how would they deal with the organizational stress created by this proposed change; how would they deal with the competing loyalties – they each worked for a particular group but were assigned to this "virtual team". And most important, how would they deal with the inevitable conflict that was going to occur? The first "team meeting" answered several of these questions.

Each person accept the responsibility for ordering lunch at our meetings; everyone would have their turn. While this was a seemingly small, unimportant task, passing around the responsibility for ordering lunch established a social contract between us that made each person a full member of the team. It would have been easy for the people with professional designations, more important titles, or outspoken personalities to place themselves above other participants, creating a more controlling environment, but no one did. The assignment also put a bit of "fun" in what was to be at times a very stress-filled environment. It created what LaFastow refers to as "a commitment of self to the project" (Larson & LaFasto, 1989, p. 76).

In a strange way, it also fostered a more creative environment. Everyone took the task to heart, ordering unusual food that demonstrated their unique heritage, exceptional understanding of caloric intake, or interest in food that was just fun. The team members

began to think outside of the box, demonstrating the diversity of their backgrounds, personalities, and thinking patterns which was to be a highlight of this team's success. In the morning before a meeting, they all spent time trying to guess what was going to be served and making fun of the person who had the responsibility for selecting it. It turned out to be a hazing process that created a relaxed, comfortable, informal, and fun environment – a fertile climate for the team's success (LaFasto & Larson, 2001, p. 68).

The second decision arrived at was just as critical. They would have meetings twice a week, assign responsibilities, and expect everyone to deliver. When the team leader raised the topic of the need to be results-driven, the mood became very serious, and he found himself listening more than driving the conversation. The team made the interesting and critical decision to engage in considerable face-to-face interaction. It was an unusual commitment of time and personal resources to the project. Everyone had other jobs, and the team members reported to other bosses, but everyone would commit themselves to delivering on responsibilities to this team.

During this conversation, every team member made a comment on responsibility and making commitments. While they used different words, they each recited the obvious challenges we faced almost as if they were chanting a mantra. But then, they reached a higher level of understanding as each member went into the benefits of the change they were working toward and its emphasis on sharing the wealth. The whole team decided when, where, and how to meet; it turned out to be one of the few times that a meeting ended on a very serious note. The team was deeply committed to its purpose, goal, and approach, and the members began the process of being very committed to each another.

The personal dedication of the team members was demonstrated in many ways, but most obviously reflected in the time invested. On most days, several of them would work well into the evening, and often the only cars in the lot would belong to team members. At first, as a good deed, but later as a running joke, the team leader would often stop by members' cars and knock the snow off the windows.

Although the entire team was making the project successful, everyone pointed to the team leader as the reason for success. As Katzenback and Smith (2003) suggest, most people overestimate the leader's role and responsibilities (p. 133). While he went out of my way to make sure the benefits and contributions of each team member were known – putting their names on the opening slide at board presentations, making sure everyone's name was on memos updating executive management, and making sure that their participation was highlighted in their annual reviews – it never felt to him he could do enough. So at every opportunity, he would do what he could, including knocking the snow off their windows. The interesting part was that for a while no one could figure out who was doing it. At one point, it was the opening topic of a team meeting, and the leader volunteered to be the first lookout.

The team was dedicated to constant and continual communications. The team made it a priority to communicate not just among ourselves but with the broader constituency. Not only did he have two official meetings a week, but they also had several informal meetings on specific subjects that were critical to moving the project forward. In addition, at 7:00 every morning, the leader briefed our executive sponsor in a meeting often attended by other team members, and every quarter, supported by a report

that the entire team would review and help prepare, the leader briefed the board of directors.

The most important thing the team did was to make sure that everyone on the team was heard (Larson & LaFasto, 1989, p. 47). The leader monitored this carefully, mediating minor disputes, making sure the quieter group members had a space to talk, and at times visiting separately with team members to counsel them on presenting issues they were passionate about.

At one of our meetings, the controller and the SEC lawyer got into a particularly difficult argument, a routine which was becoming standard operating procedure, given the tension between legal and accounting rules. The problem was that the conflict, which everyone originally felt was a healthy and important part of moving forward, was quickly developing into a dispute with very entrenched positions. The team seemed to stall for several meetings as the discussion went on but nothing was getting accomplished. The team leader met with the controller and the lawyer individually, had open discussions about the issue, and the executive sponsor did the same, but, as the weeks went by it was becoming increasingly obvious that their positions were getting farther apart and that they were both taking the dispute very personally.

No one can remember who brought it, but it is dated November 12, 1999, and it turned out to be an amazing icebreaker. It was the “Asshole Certificate.” The original, which is framed on the wall in one team member’s office, is a certificate suggesting that the person who receives it is being a jerk, and the team is asking them to stop playing a disagreeable role and just be themselves. At one of our meetings, the traditional argument broke out about the accounting rules and the law, and, as was becoming standard

operating procedure, things quickly got personal. Out came the certificate, which was presented to each of the disputants, and the other team members asked them to sign. There was a predictably awkward moment as they both read the document, and then a burst of laughter quickly filled the air; they signed, and we were off. It turned out to be a friendly reminder that ours was a "collective effort," and, while we all had our positions to represent, in the end, if we did not learn as a team, we would not be successful.

Over time, this certificate would be signed by everyone in the group – multiple times – and on occasion, we would sign it in abstentia for outside advisors and others whose behavior proved challenging. When each person was presented with the document, there was always that moment when you could challenge the demand to sign, grouse about how unfair it was, or declare that no one understood you, but in the end, it would provide relief. The certificate let you know that, for some reason, you were not being heard, and the frustration that you were feeling was making it more difficult to hear you. The team used this certificate to recognize the challenging situation and say they wanted to learn from you and with you – but we needed to stop conversation and start it again.

While the introduction of this certificate did not occur until several months after the meetings had started in earnest, it was the point at which we began evolving from a working group, defined as a place for sharing information and making decisions to enhance individual performance, to a high-performance team that supported learning and success for the whole (Katzenbach & Smith, 1994, p. 92). This transition occurred as we learned how to learn as a team and broke down the psychological barriers to open-mindedness, a step that meant we could now continually learn (Vaill, 1996, p. 80). This certificate, as silly as it seems, created a safe place in which to be told that you were

wrong, or were letting your emotions get the better of you, or were just not being understood - most important, it allowed us to go to the next level of performance

The First Crisis

While there would be a few crises in the project, none tested the team like the first one. The nature of this project required a very deep understanding of accounting and SEC law. Because the Company had chosen a leading-edge structure, the legal and accounting work needed to be tested and retested by multiple experts. This meant they needed a strong, intensive legal and accounting partnership to advise and direct us in activities. While on the accounting side they felt very confident in their long-standing relationship with a major firm, the legal side was much more challenging.

Prior to building the team our sponsor and the person primarily responsible for doing the initial research on the project, had hired a well known (translate that as *expensive*) law firm from Washington, DC. They were chosen on the recommendation of the only other company in the country to have implemented this type of ownership structure, and only after several other firms were interviewed and it became obvious that the new structure was foreign to most legal consultants. In other words, it appeared that this was law firm could give us a real jumpstart on the project.

While the firm's work prior to the formation of the team was minimal, they did recognize they would receive a substantial fee (approximately $1 million). With this in mind, and understanding the business opportunity, they developed a working relationship with our company's executive management and began to help define the project - a process which set expectations and focused everyone's efforts.

As the team initially came together, they recognized the firm's experience and worked hard to integrate them into our sessions. The team's shortcomings were obvious – they had no direct experience in setting up a program like this one – and wanted an experienced firm to help us understand the basics, help us build a written plan, and introduce us to the other company that had made the same transition. They were all desperate to gain knowledge and to find out what specific roles each person would be playing in this project, and using this firm's experience seemed the most productive way to achieve those aims.

The firm and the team decided the best way to proceed was by holding a kick-off meeting. The accountants, the law firm, and the team would get together to introduce themselves and to review responsibilities. The meeting started with an air of excitement, as most projects do, and opened with a brief presentation by the team, focusing on what we knew so far; then the accountants went next. The law firm was scheduled to present last, thinking that they would give an overview of their experience with internal market structures and act as the "teacher" for most of the meetings.

While their presentation was helpful, it displayed a bit of arrogance. Everyone seemed to notice this attitude, and, while not overtly offensive, the presentation appeared to minimize the technical expertise and experiences others brought to the table. It also appeared that the partner did not have the depth of understanding that everyone thought he had. The partner referred to another partner, who was available for consultation but too busy for our project, as the one that had done the legal work at the other company. Furthermore, the presenter gave only superficial responses to several of our questions.

These shortcomings raised a red flag, and although our team did not overreact, we did talk about our concerns at our next weekly meeting. The team all decided to have the lawyer who was on the team talk with the assigned partner, giving them some feedback on their presentation and asking more about their experience and exactly what the rules were for working with the more experienced partner.

As the weeks went by and our interface with the firm continued, it became obvious to everyone that the relationship was not working. The responsible partner was hard to contact; he constantly postponed answering our questions, and in the end the team talked more with the experienced partner than with the representative one. Aside from the obvious disappointment, the bills were outrageous. Both partners were billing at an astronomical rate, and the Company was not going to come anywhere near its legal budget if this continued.

The next few meetings focused on this challenge. The team wanted to fire the only people who had real experience on a project of this type – the firm hired by the Executive sponsor. The group debated and discussed the risk of taking this step, with the lawyer on the team leading the conversation. The leader's job was to make sure everyone was heard. The debate focused on the many risks of making this dramatic move and the unusual challenges we would face in accomplishing the goals. While it would have been easy to force the decision back on to the lawyer – but no one did. Everyone was going to make the decision on the outside legal team.

With the decision in place to hire another firm, the team made an appointment with the executive sponsor and everyone helped build a presentation. While the leader flipped through the PowerPoint slides at the meeting, outlining the reason for the change

and the plan for moving forward, each team member added important points and helped define the leader's words. As the presentation ended, the sponsor asked each member if this was what they wanted to do. Each replied "yes" in a firm voice.

Analysis and Conclusions

An analysis of this case study and the literature on teams leads to some interesting conclusions.

1) Organizational environment matters; it is never neutral. Opinion surveys conducted on teams suggest that the principal reasons for team failures are organizational factors, primarily non-supportive attitudes of senior management (LaFasto & Larson, 2001, p. 157). The executive management and board of directors of Nature never failed to support this team. They did this by making sure the team had adequate financial resources, by making available the very best people for the project, and most important, by giving them immediate access and feedback on the project's progress. This support assured the team they were wrapping the program around the Company's long-term strategic plan.
2) People matter: Nobody is as smart as everybody. This project crossed organizational lines, integrating accounting, the legal department, treasury, operations, marketing and communications, and the technology area. Each team member represented the unique perspective of one of these departments; each member used that expertise and insight to play a unique role in helping to weave the multiple objectives of these departments into the single project goal. Had any one of the team members been left out, the project's success would have been in question.

3) Communicate, communicate, and communicate. The team members all agree that the most critical and important decision made was to meet twice a week. As a result of this team-member commitment, they never had time to let the inevitable disagreements and conflicts simmer or get out of control, no project deliverable could get seriously behind, and most important, they had a chance in a comfortable, safe environment to challenge underlying project assumptions. The team learned and advanced thinking in every meeting.

In its own unusual and quirky way, this high performing team learned how to reach beyond self and build meaning out of a collective purpose. In the interviews, team members expressed this concept when they talked about "doing more," "creating lasting value," "rising above it all"; it is what Peter Drucker says reaffirms that we are not just biological, or psychological, but also spiritual beings (Beatty, 1998, p. 98). This evolved sense of purpose is what took us to the next level of performance – from simply being a "team" to being a "high-performing team" that exceeded everyone's expectations.

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OPPORTUNITIES AND PERILS: LAUNCHING A SMALL BUSINESS

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ABSTRACT

This paper seeks to bridge the gap between a number of new lines of research in microenterprise entrepreneurship with practical advice from practitioners in the small business space. We divide the issues related to launching a small business into two distinct components: feasibility and sustainability. A large body of research points to the fact that many small business struggle to incorporate well-known business practices into their startup and ongoing strategy. In addition to outlining advice for entrepreneurs we also give a comprehensive literature review of this area of research.

OPPORTUNITIES AND PERILS: LAUNCHING A SMALL BUSINESS

Introduction

There are many definitions of Micro-Enterprises in the literature; in many cases they are presented as a subset of discussions of Small Businesses. These businesses are also referred to as Small Small Businesses or Microbusinesses. Historically, the United States Small Business Administration has traditionally broken businesses into three groups: large, medium, and small. The Small Business Administration carved out from the small business category a separate place for microenterprises in recognition as to how important this segment of the business community had become when they made this distinction in 1991. Since this recognition of microenterprises as a distinct business segment in the United States, the number of these organizations have grown in number at a steady pace.

The number of employees seems to be the most common method used to define what a microenterprise as opposed to a small business is; microenterprises generally have between one employee (the owner) and ten employees in total. In contrast the Small Business category generally has between one hundred and five hundred employees depending on the type of business being discussed.

For the owner of a microenterprise the working environment can be much different than what they may be use to if they have been employed by a larger business. Owning a microbusiness places the owner in the world of entrepreneurship. For many this is a uniquely challenging environment. A prospective business owner should consider whether that is an environment that they anticipate working in an environment where they have so much control over their day-to-day activities. For many it is this autonomy that drives towards entrepreneurship [2]. One of the most unique issues is that you can and must set your own schedule; management of your time

will be critical to the success of the business. It may be necessary to set certain working times to service your customers and additional hours for the duties of the owner/operator/manager. This position requires excellent time management skills.

Working successfully in a microenterprise entrepreneur environment requires certain characteristics and skills. You will need to be comfortable with working independently and may spend much of your time working alone; which can be challenging if you are more accustom to working in a group environment. Johnston, et al. [15] present a study of using the Myers-Briggs personality tests to identify the traits of prospective entrepreneurs and find mixed evidence. Interestingly, they find that no relationship between personality types and potential entrepreneurial ability. A small business person will need to make many decisions alone which involves a high level of risk tolerance [1]; if a poor decision is made (and some certainly will be) you will only have yourself to hold accountable.

Other skill sets that you will need is the ability to be creative, persuasive and able to negotiate. Gumpert and Stevenson [11] present one of the seminal articles on entrepreneurship where they note the presence of these skillsets and the need for business of all sizes to apply them to their workforce. These skills will be needed to address issues related to starting, running, growing, and possibly exiting an enterprise.

The rest of this paper is organized as follows. Section I summarizes the key considerations for the feasibility steps in launch a microenterprise. In Section II, we explore the different facets of sustainability with applications for a microenterprise. Section III discusses extensions. Section IV presents our conclusions.

Feasibility

The idea of examining whether or not a particular business is feasible is a wide-ranging question. In order to summarize these issues we begin with the requisite training before moving into a discussion of break-even analysis. We end this section with a survey of the commonly used legal structures for a microenterprise.

This step may not be for all potential owners of microenterprises, but it is worth talking to someone at a school that offers a short non-degree program geared toward the first time entrepreneur. A number of these programs offer a Certificate in Entrepreneurship. These programs at different institutions will vary but most likely offer one course in each of the following areas and possibly one or two elective courses: Accounting, Introduction to Computers, Small Business Management, Marketing, Business Law, and Customer Service Techniques. Many entrepeneurs tend to have some practical experience in their area of business so these programs seek to fill in knowledge gaps that may be present. Hytti and O'Gorman [14] give a comprehensive overview of best practices in this space. As part of developing a new enterprise there are a number of important questions to ask.

There are a number of wide ranging reasons why someone may decide to start a microenterprise. As part of the decision to start a new business it is important that a prospective entrepreneur explore three distinct elements: determining the viability of the prospective business, choosing

the best legal form in which to do business, and setting the business up for operations. The Small Business Administration suggests that a potential entrepreneur ask themselves a number of questions focused on the motivations, mission, logistics, finances, and strategy of their new business. These questions are reproduced in the Appendix.

Many of the Small Business Administration's suggested questions will be difficult for the first time potential entrepreneur to answer without some assistance from experienced professionals. Most first-time potential entrepreneurs will not want to spend their limited available funds on advisors for many of the issues that the questions address. These consulting institutions are often keen to develop relationships with new businesses. They also provide resources for the various tax and government filings that are integral to any small business. Many certified public accountants (who are themselves microenterprises) have spent much of their career providing services to microenterprise businesses and the owners; many of these accountants will provide deeply discounted fees to entrepreneurs at this stage in order to build long-term relationships. We move next to some of the preliminary steps in calculating the financial viability of a firm.
One of the first key steps in determining the viability of a new business venture is to determine if it is both capable of turning a profit and if it can replace the salary from one's previous employment. The most important calculation is the break-even point for your new business. It is important to note here that every business venture results in a somewhat different calculation; for this reason it is important to customize all calculations to fit the type of business being analyzed. For the remainder of this paper, we assume a small service or retail business as these businesses represent the largest number of microenterprises. Other types of microenterprises would follow the same basic calculations; and it is important to tailor any analysis to the type of business being considered. A number of papers point to the lack of such analysis before the launch of a business [16]. We next illustrate this analysis at the most basic level.

We assume that we are analyzing a small retail business that sells one product. Each item is purchased for $50 and sells for $100, therefore our gross margin is 50%. We also calculate our total overhead cost to be $1,000 per month. Based on this assumed information our Break Even Point would be calculated by dividing our overhead cost of $1,000 per month by our gross margin of 50% to calculate our monthly breakeven sales to be $2,000 or 200 units. This means that if we sell 200 units per month our business will breakeven and any units above 200 per month would result in a profit of $50 per unit. In further tailoring this analysis to the entrepreneur in question we would ask whether they could anticipate a sales volume high enough to match the opportunity cost of leaving there current place of employment. This calculation can be completed for any type or size of business and is vital so that the owner knows what sales are necessary to breakeven, make a profit, and reach the point where the owner can earn enough to provide support for themselves.

A significant part of the feasibility of launching a start-up is the cost of forming a firm (which is included in the overhead) and the tax treatment (which becomes important for replacing the opportunity cost of leaving ones current employment). A new business must choose the appropriate legal form. Although there is a wide variety of legal forms the most likely options for our firms in question are as follows: sole proprietorship, partnerships, Limited Liability Company, C-Corporation, and S-Corporation. There are many other forms of businesses but they would likely not be appropriate for a microenterprise due to their cost, complexity, and other

factors. Choosing the right entity depends on a variety of tax and nontax considerations. We focus on three important dimensions of this decision: taxes, liability risk, and cost. Although selecting the right entity cannot ensure success, selecting the wrong entity can prove to be costly [12]. There some important differences between states that you plan to operate in. The most widely known of these in Finance research literature is the Delaware Effect. As these differences are not generally significant (particularly for small businesses), we do not consider them in our discussion. We also limit our discussion to the businesses that can be owned by a single person.

The sole proprietorship is one of the most basic forms of business structure. It is easy to establish and easy to liquidate. The owner is responsible for all of the business assets and liabilities including any legal liabilities that should arise in the operation of the business. Correspondingly, the owner's non-business assets may be liquidated to satisfy business liabilities. Income and expenses of the business will be reported on the owner's personal tax return. This reporting increases the chance of being selected for an audit by the Internal Revenue Service because personal tax returns with business activity have a higher audit rate than those returns without business activity. One means of minimizing liability risk is through the use of a limited liability structure.

A limited liability company, LLC, is most often thought to be a form of Partnership, but most states now allow the formation of one person LLCs. The formation of a LLC generally requires the registration of the business with the state Secretary of State. The LLC provides some liability protection for the owner's other personal assets. Income and expenses of a single-person LLC are reported on the owner's personal tax return in the same way that a Sole Proprietorship is reported or it can be treated as a Corporation for income tax filings. If reported as a sole proprietorship, the owner is exposed to the same increased audit risk as described for a sole proprietorship.

Although a C-Corporation can be used for a microenterprise, it is usually only used for large businesses and businesses with a large number of owners; microenterprises by definition would not fit into either of these situations and therefore C Corporations would not be a choice for microenterprises. Additionally, using this type of structure exposes one to the possibility of double taxation.

An S-Corporation is typically established by filing Articles of Incorporation with the Secretary of State. Once established the corporation must file an annual report and pay a annual fee to remain active. The annual fee for a microbusiness is generally as low as $25. The S-Corporation usually provides the owner of the microenterprise with the greatest liability protection for the owners other assets. Because the Secretary of State will not allow two corporations in the state to use the same name, this form of business can give the business some protection as to name selection. S-Corporations are required to file a separate tax return, although the corporation income is taxed on the owner's personal tax return. A microenterprise organized as an S-Corporation would have a very low risk of being audited as opposed to the Sole Proprietorship. This corporate structure usually gives the best blend of low cost, minimized liability risk, and low audit risk for a microenterprise.

Sustainability

An enterprise that is determined to be feasible must next meet the threshold for long-run sustainability. We focus here on the presence of corporate social responsibility because it give the best all-encompassing picture of the many concerns of a microenterprise.

Corporate social responsibility, CSR, is described as a contrast to the traditional view that a corporation should be managed exclusively for shareholders. The basic idea is that groups of stakeholders versus shareholders better represent the broader interest of business's constituents and considers not only profitability but also social and ethical considerations sometimes overlooked in the more traditional business model. The theory holds that organizations can build corporate goodwill and create a competitive advantage by including non-economic factors – such as broad based discussions of workers' rights, environmental considerations and non-business related community activities - into their strategy [19]. While CSR is a grab bag of activities—including recognizing community leadership responsibilities, being an active corporate contributor, and being environmentally minded in operations—it is considered by those who have successfully implemented CSR to be one of the cornerstones of a culture. However the research on the subject and questions on its value creation have produced mixed results, leaving many to question the usefulness of including social responsibility as a corporate goal [13].

The rapidly changing cultural implications of CSR and its growing importance to consumers and governments, along with early mixed results from academic research have left many grasping to define the activity and to come up with a measurement of CSR success or failure. This limitation has not held back academics from doing considerable research in and around the subject – highlighted by multiple studies investigating the connection between CSR investments and financial profits. While the research has produced inconclusive results and findings, it has highlighted the challenge of those studying CSR - measuring and monitoring the success (or failure) of this approach to business is extremely difficult given there is no clear and concise definition of social responsibility.

This has left some to suggest there is a lack of academic rigor and discipline in and around research on CSR and leads many to believe that the conclusions and outcomes of the studies on the subject are in question [9]. Griffin and Mahon [10] examining 25 years of historical research on CSR, suggest that much of the inquiry on CSR and financial performance is flawed because the definition of CSR is unique to the circumstances, situation and how shareholders define financial performance. They further say that there is no definitive empirical research on value creation of a CSR business model [10].

The struggle among researchers has not held back the debate and discussion on the social responsibility of businesses and the subject has seemingly gained speed and considerable interest among a broad base of constituencies [21] [24]. Recognizing that there is interest in the topic and room for study and clarification, many in the academic community have looked for a well-defined, consistently measured tool that could be used to further their research and enhance the validity of studies in this area. To that end some have used CRA, which has been referred to as an "instance of voluntary CSR" [29] as a measurement tool for CSR. This law which covers U.S. federally insured banks, has the goal of promoting development of low-income communities in

safe and sound ways and represents a multi-dimensional construct that provides researchers with a single measurement that describes several aspects of CSR.

Extensions

A business that meets the feasibility and sustainability criteria will next need to focus on a myriad issues related to growth, optimal size for the entrepreneur, and many, many other issues. Here we show how our preliminary ideas fit into the larger life cycle of companies and the corresponding literature in this area.

Additional work should be completed to identify and study the prevalence of feasibility studies on the success of micro-enterprises. Unfortunately, many entrepreneurs may enter into a micro-enterprise because they like to do what they plan to do in their new business; just because someone likes to restore old cars does that mean that restoring old cars can be a financially sustainable enterprise that can provide enough financial resources to support the owner's lifestyle. Here surveys of the motivation of micro-entrepreneurs can provide unique insight into the possible success of the business. Survival windows provide a unique natural experiment in the factors that contribute to the success or failure of a micro-enterprise. Work could be done to identify several common micro-enterprise businesses to determine the success (or failure) rate of such businesses after one year, five years and longer periods of time to determine feasibility. Several interesting questions emerge to compare these two groups (those who survive and those who do not): financial health of the founder prior to starting the business, the financial resources available to sustain the business, approach to marketing the product or service, the skill set of the founders in the area that the business operated, and the work ethic of the founders. The previous list is only a short list of issues that could be studied to seek knowledge in the area of micro-enterprises feasibility; many more issues should be identified and ranked as to importance prior to launching a feasibility study.

The results of these studies would be invaluable for entrepreneurs to keep from depleting significant financial resources pursuing a business that has a low probability of success before it is launched and identify opportunities that may not be under consideration that could result in a success business.

Conclusion

In this study we have explored many of the best practices for micro business entrepreneurship. While many articles and books have been written on the issues associated with launch a new business, we seek to give particular focus to micro enterprises. Additionally, we supply a large volume of academic literature as further evidence of these best practices. Though we will never live in a world where there will no longer be any small business failures we hope that with open resources we will see fewer small business failures due to entirely preventable errors.

APPENDIX

Questions recommended by the Small Business Administration for new entrepreneurs.

1. Why am I starting a business?

2. What kind of business do I want?
3. Who is my ideal customer?
4. What products or services will my business provide?
5. Am I prepared to spend the time and money needed to get my business started?
6. What differentiates my business idea and the products or services I will provide from others in the market?
7. Where will my business be located?
8. How many employees will I need?
9. What types of suppliers do I need?
10. How much money do I need to get started?
11. Will I need to get a loan?
12. How soon will it take before my products or services are available?
13. How long do I have until I start making a profit?
14. Who is my competition?
15. How will I price my product compared to my competition?
16. How will I set up the legal structure of my business?
17. What taxes do I need to pay?
18. What kind of insurance do I need?
19. How will I manage my business?
20. How will I advertise my business?

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OPTIMIZATION OF EMPTY CONTAINER MOVEMENTS FOR FREIGHT FORWARDERS

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ABSTRACT

Management of the container movements is critically important for seamless integration of logistics and supply chain processes. Any disruption in transport, storage and movement of empty containers, namely, empty container management may pose problems for both liners, carriers, transport organizers or forwarders. In a highly competitive maritime industry, carriers carry the heaviest cost burden in case their shippers' empty container demand is satisfied on time. In case of empty demand shortage, typically forwarders provide alternative carrier service which have available empty containers on site. Therefore, tracking and monitoring real-time demand and supply of empty containers for carriers become complex and critical issue for transport organizers, or forwarders. Therefore, in this study, we focus on the empty container management problem from the transport organizer's or forwarder's point of view. By examining the relevant container management process with all relevant factors and dynamics, we develop an optimization model which aims to minimize the total cost of empty container movement. The results of the proposed model are demonstrated with numerical data from a real logistics company.

INTRODUCTION

Globalization, agile manufacturing, speed-to-market delivery and improved supply chain management create greater demand for door-to-door freight transportation, which is usually possible with containerization. Containerization has many benefits for shippers, consignee and transport service providers but at the same time it has some difficulties. One of the major difficulties of containerization is empty container management. In order to fulfill demand timely, transport service providers should decide whether they will use company-owned or leased-containers. Also, leased-containers' contract terms are another issue. Another important difficulty for containerization is the cost calculation and decision of buying new containers or maintenance cost of aged containers.

Table 1. Benefits and difficulties of containerization

Benefits	Difficulties
• Reduce traffic pressure on roads • Unique form (increase productivity and efficiency) • Increase safety for manufacturers • Reduction cost • Reduction service time • Easy handling • Efficient stowing process • Increase dangerous goods such as chemicals trade worldwide	• Empty container management • Leased- or owned- container usage and leasing contract terms • Design of network • Containers those go to underdeveloped containers does not come back • Cost of manufacturing and buying new containers • Cost of inspection and maintenance aged containers

Although containerization has many advantages, empty container management has been an important problem for transport service providers due to backlogged empty container demand and inefficiencies in the operational stage. Empty container management problem is a well-studied problem in the literature. However, most of the research reflect the view of liner shipping companies and focus on overly simplified problems in terms of container types, leasing costs and real-time data.

In this study, we examine the pre-carriage and post-carriage of empty containers for a freight forwarder company. After a brief literature review on empty container management, we explain the empty container management problem of the freight forwarders as the decision maker. A mathematical model, which aims to minimize the cost of pre-carriage and post-carriage of empty containers, is formulated and a case study for a company is presented as a numerical example.

LITERATURE REVIEW

In this section, we review the literature on empty container management. The relevant methodologies can be categorized as stochastic programming, multi-stage deterministic inventory problem and dynamic programming.

Crainic et al. [2] could be the first who specifically examined the empty container reposition problem in stochastic environments. They tried to solve the inland transportation of empty container between ports, depots and customers. Another pioneer study by Cheung and Chen [1] proposes a two-stage stochastic network model for the dynamic empty container allocation problem optimizing optimizes where and when empty containers should be repositioned and how many leased empty containers are needed to fulfill customer demand. While formulating the model, they assumed that there is only one type container and all demand is fulfilled with unlimited supply of leased containers with a constant cost. Another study that considers stochastic programming approach is by Shintani et. Al. [6], which focuses on empty container repositioning among calling ports and tries to maximize profit while picking up and delivering cargoes.

Researchers in [3], [4] and [5] model empty container management problem as a multi-stage inventory problem. In [3], using a integer programming model, authors show that length of planning horizon has an important effect on empty container allocation and longer planning horizon can give better empty container repositioning plans. Li et. al [4] examine the allocation methods of empty containers at Hong Kong port and Wang and Wang [5] evaluated repositioning the empty containers by minimizing the transportation cost from supplier to port and port to demand point.

In [7], authors develop dynamic programming model to find effective operational strategies for the empty container allocation problem. The dynamic container allocation (DCA) problem is formulated for a two-ports two-voyages DCA and a multiple-ports multiple-voyages systems. Using a hourly time intervals in a dynamic network, Olivo et al. [8] propose a model to minimize the overall cost of managing empty containers on a continental scale.

Table 1. Summary of Literature on Empty Container Management

PAPER	MAJOR DECISION	OBJECTIVE	METHOD
Shintani et al. (2007)	Network Design Problem with Empty Container Repositioning	Maximization of the Profit	Heuristics
Choong et al. (2002)	Empty Container Management for intermodal transportation networks	Minimization of Empty Container Management	LP
Cheung & Chen (1998)	A Two-Stage Stochastic Network Model and Solution Methods for the Dynamic Empty Container Allocation Problem	Minimization of cost Empty Container allocation	Stochastic programming
Li et al. (2004)	Empty Container Management in a Port with Long-Run Average Criterion	Minimization	Multistage inventory
Wang & Wang (2007)	Optimization of Intermodal Empty Container Reposition of Land Carriage	Minimization of cost of distributing empty containers from port to port	Integer Programming
Lam et al. (2007)	An approximate dynamic programming approach for the empty container allocation problem	Minimization of cost of empty container allocation	Stochastic
Thefanis& Boile(2008)	Empty marine container logistics	Management strategies	Strategic Management
Olivo et al. (2005)	An operational model for empty container management	Minimization overall cost of managing empty containers	LP
Crainic et al. (1993)	Dynamic and stochastic-models for the allocation of empty containers.	Minimization of interland transportation cost	Stochastic programming
Crainic et al. (1993)	A tabu search procedure for multicommodity location/allocation with balancing requirements.	Minimization of total cost by using multicommodity	Tabu search

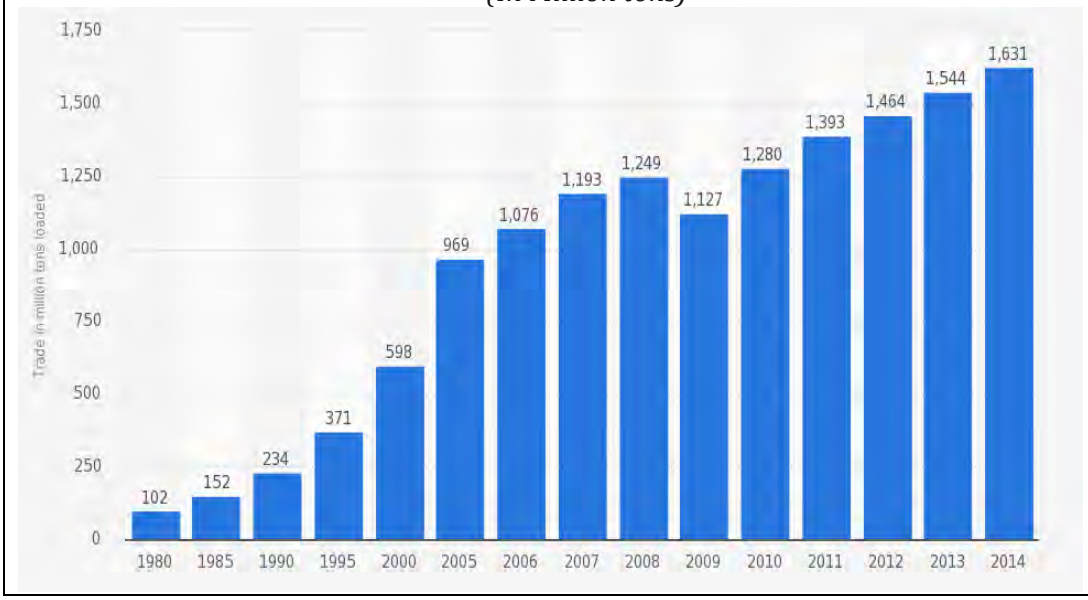
Although most of the studies summarized in Table 1 are at operational level, there are few studies such as [9], [11] focusing on different strategies in empty container management. For a comprehensive review of literature, we refer the readers to a book chapter [10].

CONTAINER MANAGEMENT

According to UNCTAD report (2008), containerized trade grew nearly 10% every year since 1980. Figure 1 shows the growth of international containerized trade. The cost of reposition of empty containers was more than 50 billion dollars globally in 2010 [5].

Figure 1. International seaborn trade carried by container ships

(In Million tons)

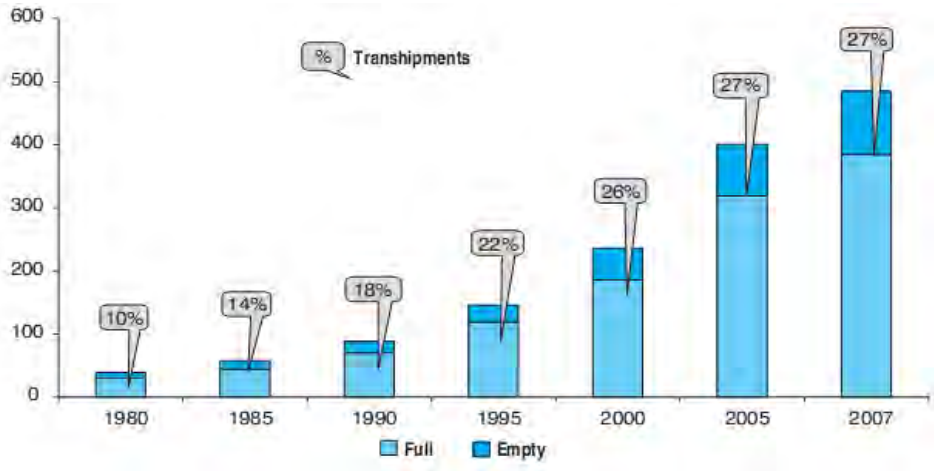


Source: UNCTAD, Clarkson Research Services, Shipping Review Database, 2015.

The main players in the container traffic are manufacturers who produce goods for global use, freight forwarders, shipping lines, shipping lines agencies, transfer facilities (pre-carriage and post-carriage), warehouses, container manufacturing and maintenance companies, container leasing companies and customers who buys goods from other countries. For shippers and consignees, container is a packaging equipment which makes their goods to reach destination point in a safe way. For freight forwarders, shipping lines and their agencies, container is a part of service which they are providing to their customers. Container is a core product for container manufacturing and container leasing companies.

Figure 2. International Container Port Traffic, 1980-2008

(Million TEUs)



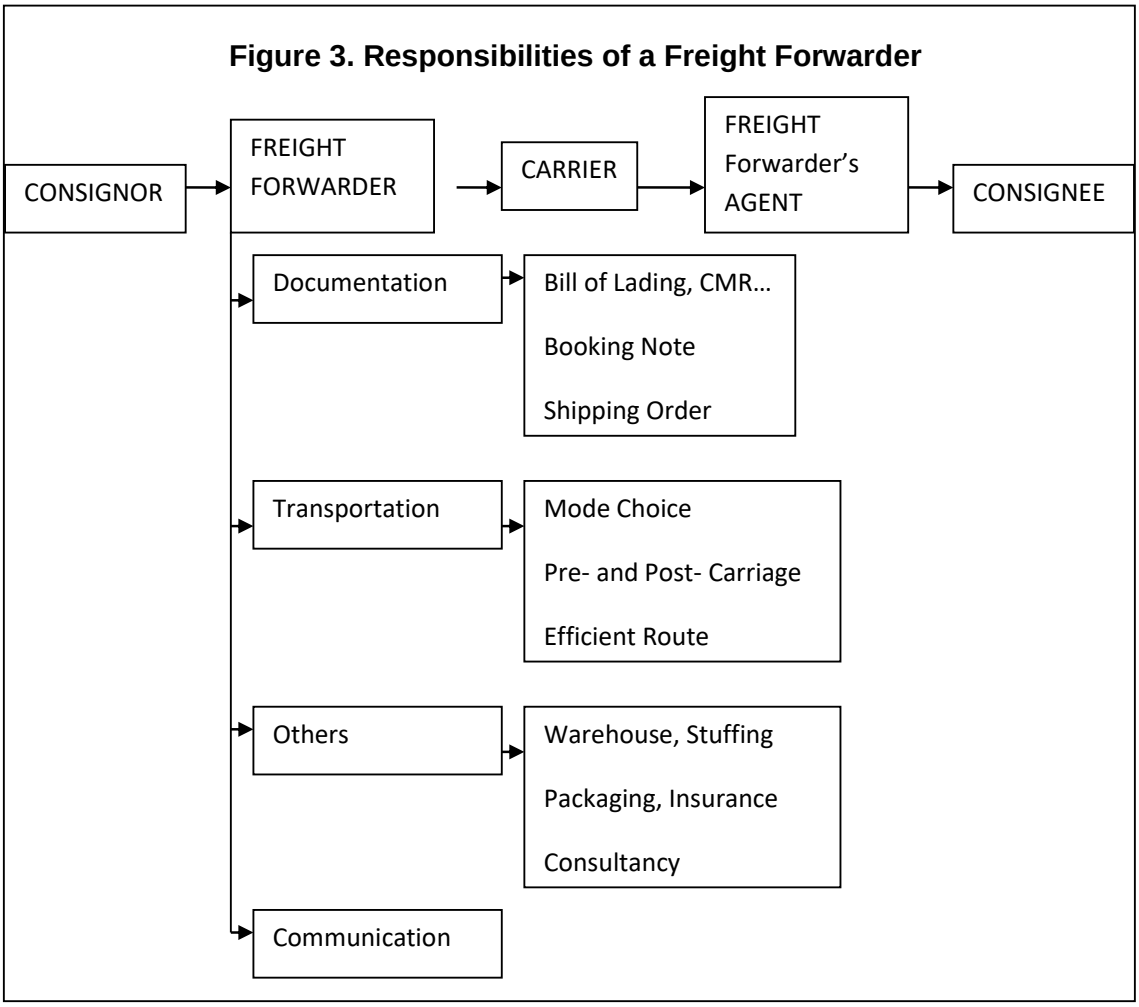
source: UNCTAD based on data provided by Drewry Shipping Consultants , 2007.

As shown in Figure 2, more than 20% of international container port traffic is used for empty container movements. One of the major causes of increasing ratio of empty container movement is the chronic trade imbalance between the West and East. While export rates of China and Asia is growing faster than their import rates, liner operators decide where, when and how many containers should be repositioned to fulfill demand. To reposition the containers, they should forecast the future demand and supply (empty containers on board) accurately. If the supply of empty containers exceeds the demand, holding cost and inland transportation cost will occur for the shipping company. Another problem for empty container repositioning is different customs regulations and port charges in different countries. In practice, repositioning operations are performed by freight forwarders, who act as transportation organizers between the shipper and the carrier [12]. Freight forwarders also provide pre-carriages and post-carriages; give consultancy about insurance, customs and documentation processes, warehousing and handling services, loading and packaging operations. One of the most important responsibilities of a freight forwarder is deciding the best cost and time efficient route [13, 14]. While they are determining route, they should also choose the best reliable and efficient loading and discharge port if they are going to use maritime transport. They should also consider the port charges because they could vary among the countries. After they select the best transport mode for their customers, they should also choose the best carrier for their customers according to freight type, transit time, and reliability, fast response to problems, security and tracing ability. Followed by mode and carrier selection, they make booking and scheduling. They give information their related agencies in the discharge country.

The shipment document is also a part of freight forwarder's responsibility. Bill of Lading, CMR, CMO or Air Waybill should be prepared per preferred transport mode. Also, to complete movements of goods seamlessly, other transport document which will be prepared by customers should be checked. In addition, freight forwarders may also provide warehousing, loading and unloading services, if their customer requests. While organizing the transportation, freight forwarders maximize their profit by shipment consolidation.

Figure 3 shows that how a typical freight forwarder works in Turkey. First, they take order from the consignor and then look at the possible routes and transport modes. After deciding the route and mode, freight forwarder communicates with the possible carriers and takes freight rates, vessel schedules and transit times. Finally, he/she chooses the appropriate one and makes the booking. Then, he/she gives the information about mode, vessel to the customs agent and at the same time stuffing process is started. After the goods are loaded onto the designated vessel, freight forwarder prepares necessary documents and traces the goods until they reached their destination.

Figure 3. Responsibilities of a Freight Forwarder



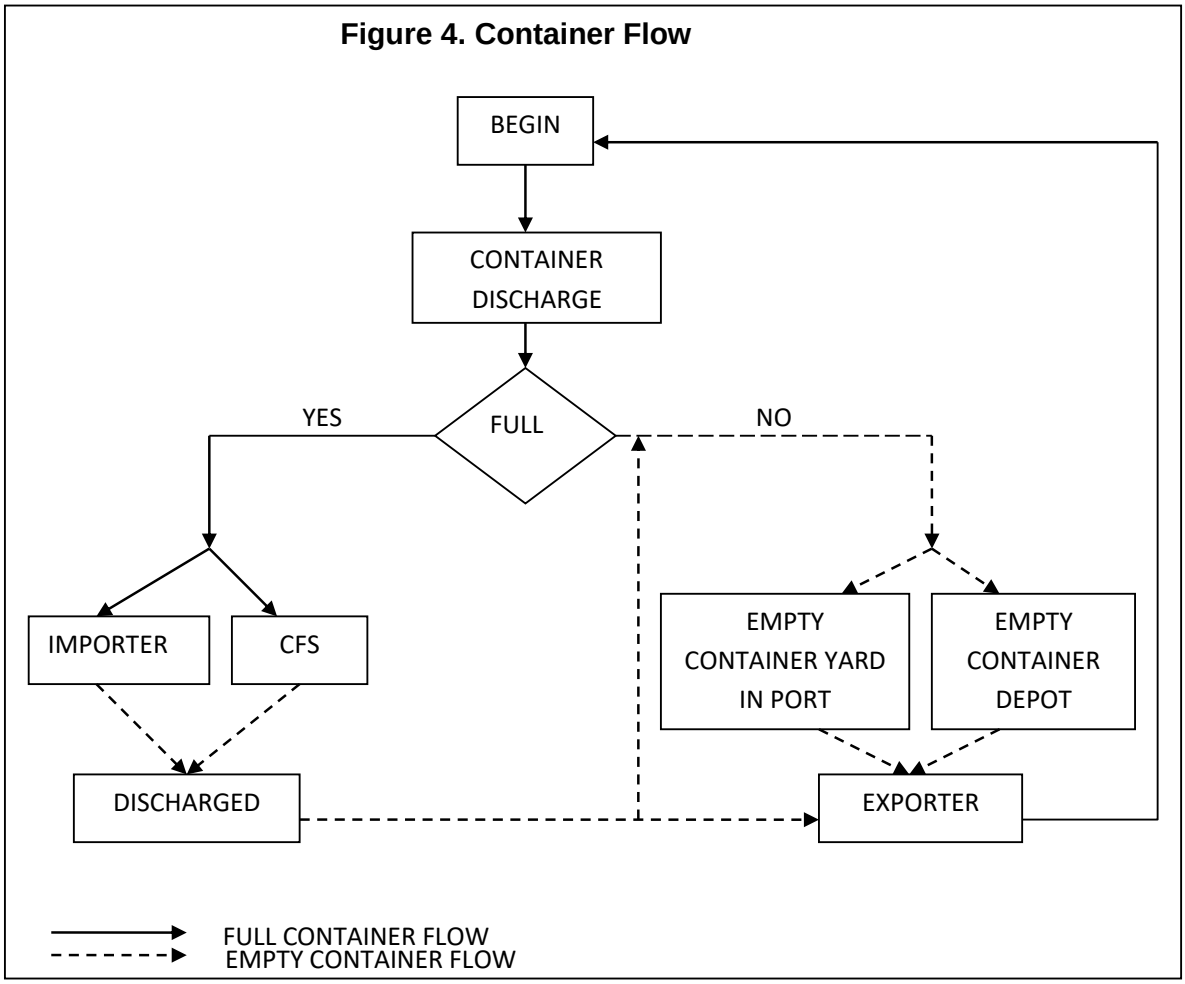
EMPTY CONTAINER PROBLEM FOR FREIGHT FORWARDERS

In this section, before we present the empty container problem for a freight forwarder, we review a typical container flow on land. For importers, it starts with arrival of the full container to the discharge port, when advice of arrival is posted to importer. After the customs operations are completed, full container is transported to the importer's location or warehouse to unload the goods inside. When container is unloaded, it is delivered to empty container depots or empty container yards at the ports or at the exporters. The main function of depots of liner shipping companies is to store empty containers and provide empty containers to exporters to satisfy their demand timely. Based on the ship schedules, both full and empty containers are tracked and forecasted. As soon as, they are discharged from the ships, they are shifted to empty container yards in the port or empty container depots outside the ports.

The flow of containers for exporters can be explained as follows. Empty containers are provided to the exporters from liner shipping companies' depots or empty container yards at the ports. In case of unavailability or times conflicts, empty containers could be provided directly from the importer's site to the exporter's site. After empty containers are transported to exporter's site, loading process begins or sometimes exporters may prefer loading at the port container yards. After the loading process, the full containers

are transported to ports to be loaded on the ships. This whole operation is called as pre-carriage. After the entrance of the designated vessel to the port, these containers are loaded on board. Figure 4. exhibits the container's flow.

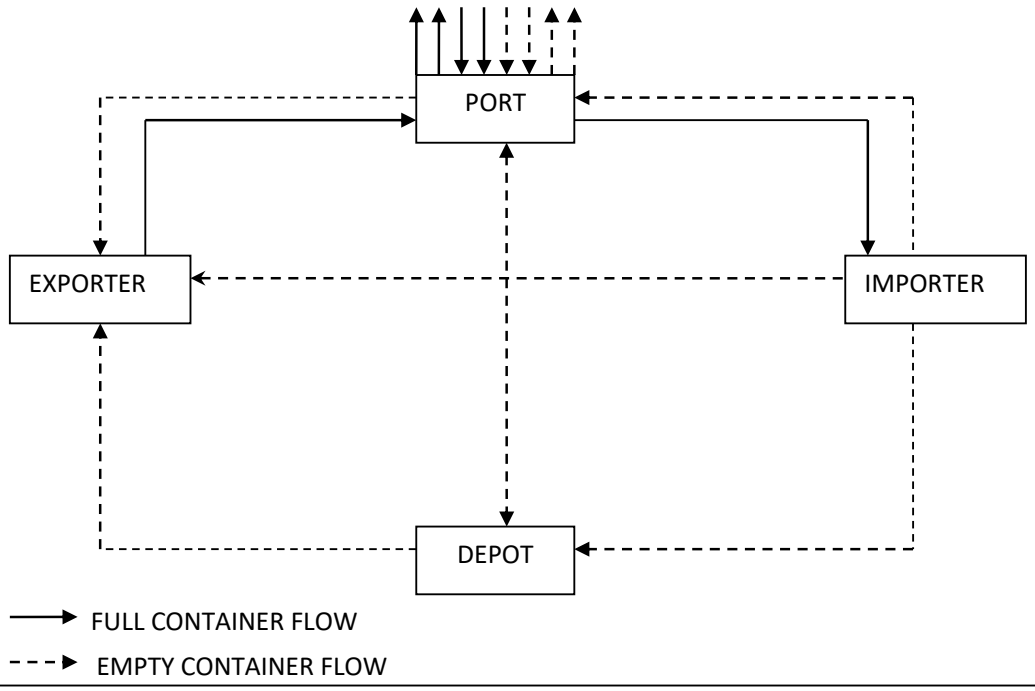
Figure 4. Container Flow



Reposition of empty container can be divided into two parts: reposition of sea-carriage and land-carriage. Empty container repositioning of land carriage cost includes cost of port-to-exporter's site, depot-to-exporter's site, importer's site to exporter's site or importer's site-to-port, importer's site-to-depot.

When a full container is discharged from a ship, first importer is informed with the arrival notification and then importer gives order about unloading of container. Per importer's decision, container could be unloaded at importer's factory, warehouse or at container freight station (CFS) at the port. When a full container becomes an empty container, it is transported to empty container yards in the ports, depots or exporters' site. Then an exporter picks up the empty container from the depots, ports or importer's site. When there is a freight forwarder, he/she undertakes the transportation process and acts as an agent of exporters. After loading, full containers are moved to port to be loaded on the ships. This container may then satisfy another demand after it reaches the destination point and de unloaded.

Figure 5. Land Carriage of An Empty Container



As it mentioned before, freight forwarder is responsible to organize the shipments in a cost and time efficient way. Therefore, freight forwarder should decide where she/he is going to take the empty container to satisfy an exporter's demand in the best economic way or where he/she is going to transport and deliver the empty container to complete importer's transportation after the post-carriage.

Model Assumptions

- The number of full containers that arrive and leave the location in a certain time period is known.
- All demands must be satisfied and cannot be delayed until the next time period;
- Containers are ready to use and no necessary repairs occur.
- One type commodity is allowed. No substitution of commodity.
- Empty containers will not be loaded early to demand customers to meet the demand of future periods.
- Two types of transportation modes are used for inland movements: truck and train.
- Two types of containers are considered: 20dc and 40dc. Because in real life, there are a lot of types of containers such as 20open top, 40 open top, 40 high cube, 20 reefer or 40 reefer.
- As soon as a full container arrives the supplier (importer's site), it is unloaded immediately and becomes an empty container.
- All shipments are considered as door-to-door movements. (in real life, transportation process changes according to delivery terms.)
- Only one liner shipping company is used.

Mathematical Formulation

An optimization model of empty container movements for freight forwarders is developed using the following notation.

Notation

SETS
S: Supply customers (importers), indexed by s*=1,2,……,S* I: Demand customers (exporters), indexed by *i=1,2,……,I* K: Set of container ports, indexed by *k=1,2,……,K* J: Set of empty Container Depots, indexed by *j=1,2,……,J* D: Container type, indexed by *d=1,2* (20dc and 40dc) M: Transportation mode indexed by *m=1,2* (Train and Truck) T: Length of planning horizon, indexed by *t=1,2,3…..T*
PARAMETERS
COSTS:
c_{sidm} : cost to move a *d* type empty container from supply customer (importer) s to a demand customer (exporter) *I* via transportation mode *m.* c_{sjdm} : cost to move a *d* type empty container from supply customer (importer) s to an empty container depot *j via* transportation mode *m.* c_{skdm} : cost to move a *d* type empty container from supply customer (importer) s to an empty container yard in the port *k via* transportation mode *m.* c_{jidm} : cost to move a *d* type empty container from an empty container depot *j to* a demand customer (exporter) *I* via transportation mode *m.* c_{kidm} : cost to move a *d* type empty container from an empty container yard in the port *k to* a demand customer (exporter) *i* via transportation mode *m.*
KNOWN DEMANDS AND SUPPLIES:
x_{id}^{t} : Demand at customer *i* in period *t.* y_{sd}^{t} : Supply at customer *s* in period *t.*
DECISION VARIABLES
u_{sidm}^{t} : number of *d* type empty containers from supply customer (importer) s to a demand customer (exporter) *I* via transportation mode *m* at the *t* time. u_{sjdm}^{t} : number of *d* type empty containers from supply customer (importer) s to an empty container depot *j via* transportation mode *m* at the *t* time. u_{skdm}^{t} : number of *d* type empty containers from supply customer (importer) s to an empty container yard in the port *k via* transportation mode *m* at the *t* time. v_{jidm}^{t} : number of *d* type empty containers from an empty container depot *j* to a demand customer (exporter) *I* via transportation mode *m* at the *t* time. v_{kidm}^{t} : number of *d* type empty containers from an empty container yard in the port *k to* a demand customer (exporter) *i* via transportation mode *m* at the *t* time.

Mathemarical Model

$$\min \sum_t \left[\sum_s \sum_i \sum_d \sum_m c_{sidm} u^t_{sidm} + \sum_s \sum_j \sum_d \sum_m c_{sjdm} u^t_{sjdm} + \sum_s \sum_k \sum_d \sum_m c_{skdm} u^t_{skdm} \right] + \sum_t \left[\sum_j \sum_i \sum_d \sum_m c_{jidm} v^t_{jidm} + \sum_k \sum_i \sum_d \sum_m c_{kidm} v^t_{kidm} \right] \quad (1)$$

s.t.

$$\sum_m \sum_s u^t_{sidm} + \sum_m \sum_j v^t_{jidm} + \sum_m \sum_k v^t_{kidm} = x^t_{id} \qquad \forall i,t,d \quad (2)$$

$$\sum_m \sum_i u^t_{sidm} + \sum_m \sum_j u^t_{sjdm} + \sum_m \sum_k u^t_{skdm} = y^t_{sd} \qquad \forall s,t,d \quad (3)$$

$$u^t_{sidm}, u^t_{sjdm}, u^t_{skdm}, v^t_{jidm} v^t_{kidm} \geq 0, \text{integer} \qquad \forall d,i,j,k,m,s,t \quad (4)$$

The objective of model the model is to minimize the total cost of empty container movement of a freight forwarder over a given planning horizon. The total cost (1) includes cost of moving empty containers between locations. Constraint set (2) states that all demands must be met by empty containers from supply customers (importers), empty container depots and/or ports. Constraint set (3) states that all containers must be transported after unloading process from supply customer sites (importers) to demand customers (exporters), empty container depots and/or ports. Constraint set (4) indicates that all decision variables can only take non-negative integer values.

NUMERICAL EXAMPLE AS A CASE STUDY

In this section, provide a numerical example to demonstrate the cost benefits of the proposed model with a real company data obtained from a freight forwarder located in Izmir, Turkey. Based on a 31-day planning horizon, 5 importers (AM, DM, GM, PM, TM), 5 exporters (GX, HX, MX, OX, PX) and 10 container depots resulted in a mathematical problem with 73099 non zero variables, 993 equations and 33233 variables. CPLEX solver with GAMS interface is used to find the optimal solution for the given instance of the problem.

Tables 2,3,4,5 and 6 show the optimal results for inland empty container movements of the company with minimum total cost of 26,937 TL. Table 2. shows the optimal empty container movements between importer and exporters. For example, 2 20dc empty containers transported from importer GM's site in day 2.

Table 2. SOLUTION (Z*=26937 TL) **No. of containers from Importers to Exporters**

DAY	S	I	TRUCK		TRAIN	
			20	40	20	40
2	GM	OX	2			
3	DM	GX	1			
4	GM	MX	1			
4	GM	OX	1			
4	PM	MX	1			
6	AM	GX	1	1		

9	PM	PX	4			
10	GM	OX			4	
17	PM	MX		1		
18	PM	MX	1			
18	PM	OX	1			
18	TM	HX	1			

Table 3. shows the optimal number of empty containers that should be moved from importers' site to the container depots. According to optimal results, truck is the preferred mode cost efficient, which is expected because many importers' or exporters' location do not have a railway connection.

Table 3. SOLUTION From importers to empty container depots

DAY	S	J	TRUCK		TRAIN	
			20	40	20	40
2	TM	GUNAYDIN			3	
3	DM	HAYKOP		3		
4	PM	SUTCULER	5			
4	AM	OZHADIMKOY	3			
5	GM	OZNAK	9			
5	OM	HAYKOP	3			
6	AM	OZHADIMKOY	1			
10	GM	OZNAK		1		
12	PM	SUTCULER	8			
17	OM	HAYKOP	4			
17	PM	SUTCULER	2			
18	TM	GUNAYDIN			4	1
18	PM	SUTCULER	4			
31	PM	SUTCULER	6			
31	PM	SUTCULER	2			
31	GM	OZNAK	4			

According to Tables 4 and 5, empty containers which will be transported from importers to ports or from empty container depots to exporters' site will use the truck. But empty containers which will be moved from ports to demand customers (exporters) will use railway as far as trucks.

Table 4. SOLUTION From Importers to Ports

DAY	S	K	TRUCK		TRAIN	
			20	40	20	40
2	GM	IZMIR	4			
3	DM	HAYDARPASA	1			
4	GM	IZMIR		1		
5	OM	HAYDARPASA		2		
5	GM	IZMIR		1		
10	DM	HAYDARPASA		1		
12	OM	HAYDARPASA	5			
12	AM	AMBARLI	4			
14	GM	IZMIR	5	5		
24	DM	HAYDARPASA	4	1		

Table 5. SOLUTION From Depots to Exporters

DAY	J	I	TRUCK		TRAIN	
			20	40	20	40
5	SUTCULER	PX	2			
23	SUTCULER	PX	2			
30	SUTCULER	PX	4			
30	SUTCULER	PX		5		
6	OZNAK	MX	1			
9	OZNAK	OX	1			
18	OZNAK	SX		1		
25	OZNAK	MX	1			
25	OZNAK	OX	1			
27	OZNAK	MX	1			
6	OZHADIMKOY	GX	1			
9	OZHADIMKOY	GX	1			
18	OZHADIMKOY	GX	1			
20	OZHADIMKOY	GX	1			
31	OZHADIMKOY	GX		2		

Table 6. SOLUTION From Depots to Exporters

DAY	K	I	TRUCK		TRAIN	
			20	40	20	40
11	IZMIR	OX	2			
11	IZMIR	UX			3	
11	IZMIR	SX		2		
13	IZMIR	SX		1		
13	IZMIR	UX			1	
16	IZMIR	UX			2	
18	IZMIR	IX	1			
20	IZMIR	OX	6			
20	IZMIR	MX	1			
20	IZMIR	UX			3	
23	IZMIR	IX	1			
24	IZMIR	UX			3	
25	IZMIR	UX			2	
26	IZMIR	UX			8	
26	IZMIR	MX	1			
27	IZMIR	IX	1			
27	IZMIR	OX	1			
18	AMBARLI	GX		3		
31	AMBARLI	GX	1			
17	MERSIN	HX		2	1	
19	MERSIN	HX			1	
20	MERSIN	HX			1	
27	MERSIN	HX			1	
2	GEMLIK	CX	2			
3	GEMLIK	CX	2			
13	GEMLIK	CX	2			
20	GEMLIK	CX	1			
2	ANTALYA	AX	1			
11	ANTALYA	AX	1			
30	ANTALYA	AX	1			

CONCLUSION

With the globalization and rapid increase in international trade, freight forwarder companies which organize the whole transportation operations and act as an agent of shippers become more important. While giving best services to their customers, freight forwarder companies should calculate every step of transportation and should choose the most efficient service to their customers. One of the most important steps of transportation is inland container movements between the customers and ports or empty container depots. Therefore, this study aims to provide an optimization model for freight forwarder's empty container movement problem. When we comparing the actual costs with the cost obtained as a solution of the proposed mathematical model, we observe about 20% improvement.

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PERCEPTIONS OF COLLEGE STUDENTS ON MEDICAL TOURISM

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ABSTRACT

This paper studies the perceptions of students who seek care outside the United States. Convenience cluster sampling was conducted between March 2013 and May 2014, and it yielded 401 samples. Principal component analysis yielded three factors – risk, vacation, and social-related. The results include: The well-insured were more sensitive than the less-insured to risk factors if they travel for care; the better-educated were less likely than the less-educated to be motivated by risk factors; those who spoke a foreign language were less sensitive than those who spoke only English to risk factors. Finally, the blacks were less sensitive than the whites to risk factors.

INTRODUCTION

As healthcare costs rise and consumers lose employer-provided insurance coverage, medical tourism is becoming increasingly popular in the United States. In this study, we administered a survey of consumers' perceptions of medical tourism. The specific aims of our research were (1) to identify factors that most motivate consumers to travel abroad for medical treatment, and (2) to find out who among various demographic groups are inclined to be motivated by these factors. This study found links between medical tourism and variables that have not been studied previously such as education, ethnicity, foreign language spoken, and whether one has heard of "medical tourism".

We hypothesized that consumer characteristics will affect the consumer's perceptions of medical tourism. The consumer characteristics we included in this study were: the ownership of various types of health insurance, income, age, marital status, education, gender, ethnicity, foreign language proficiency, health status, community, and whether one has heard of the concept of medical tourism.

LITERATURE REVIEW

Typical medical tourists are driven by cost savings [18][20][37], whether they are treatment costs or economic incentives offered by third party payers. Beyond cost saving, consumers often face risks stemming from both the medical and travel aspects of medical tourism. The medical aspect of risk relates to the quality of care, which has several facets, such as surgical outcomes [10], more personalized care [13], good credentials of foreign physicians [43], advanced medical

technology and equipment [10], and hospital accreditation and reputation [31]. Additionally, some consumers are motivated by other vital aspects of care such as faster access [5][19][18][37], availability of treatment [35][7], and the assurance of continuity of care [26][1][12][39]. Furthermore, consumers' willingness to travel for care outside their countries is also influenced by several social-related aspects of care such as a stable political and social environment [4], a sound legal system to address medical malpractice or negligence [33][39], a "similar culture" which includes a familiar care environment [26][30][37], or the fluency of the hospital staff in the consumer's native language [37][30], assurance of treatment confidentiality and the protection of medical records.

Insurance Status

The numbers of the uninsured and underinsured are expected to grow as the rising cost of healthcare forces employers to reduce the health benefits that they offer [39]. However, the passage of the Affordable Care Act (ACA) of 2010 has caused the number of uninsured Americans to fall from 50 million in 2010 to 29 million in 2015 [11][3] as they were required by law to be covered by some form of health insurance. Previous studies showed that many medical tourists who traveled for care were uninsured [8][9][14][21][29][38][40]. In contrast, consumers whose treatments are covered by their health plans often only pay a small fraction of their treatment costs in their home countries, and consequently they are less likely to travel abroad for medical care. However, the uninsured, the underinsured, and consumers whose insurance plans do not cover the procedure sought often would pay the full price. Approximately 12.6% of the non-elderly population in the United States were uninsured in 2015 [3]. In 2007, 29% of those who had insurance were "underinsured" with coverage so limited that they often delayed their treatments [6]. The uninsured and the underinsured will particularly benefit from the cost savings derived from seeking treatment abroad. Because the out-of-pocket expenses to the uninsured and the underinsured are substantially higher than they are to the well-insured consumer, the insured and the underinsured consumers are less motivated by various forms of risks stemming from medical, travel, and financial aspects. The well-insured consumers, on the other hand, tend to interact more with doctors and may rely more on their medical consultations [42]. They tend to have higher expectations of medical outcomes and medical risks, we thus hypothesize that they will be more motivated than the less insured by risk factors that include various aspects of quality of care.

Education

While higher education may lead to a greater willingness to seek care, it can also mean a greater ability to produce healthcare at home [16]. Ichoku and Leibbrandt [24] found a positive relationship between household education and the number of physician visits. Some found that a consumer's medical knowledge is directly associated with the likelihood of seeking treatment [27], while Hsieh and Lin [22] found that elderly with better knowledge of health tended to practice preventive medical care. According to Goodrich and Goodrich [15], an average medical tourist tended to have at least a bachelor's degree. One study found frequent travelers tended to have higher incomes and higher education than the general population [44], while another study

found cultural tourists were more likely to be well-educated with higher earnings [36]. We expect that consumers who are better-educated tend to be more sensitive to the vacation factor, being better informed than the general population of the availability of the cost savings, non-traditional treatments, and being more able to comprehend the inducements and incentives offered by their insurance companies or employers.

Foreign Language

Several studies have demonstrated that the proficiency in a foreign language is positively linked to traveling abroad for care. The study by Su et al. [38] also found a direct relationship between fluency in Spanish and the use of Mexican medical services. The use of medication purchases and the frequency of doctor visits actually rose with higher levels of Spanish fluency. De Jesus & Xiao [9] also found that Hispanics with low English proficiency scores were more likely to travel to Mexico or any Latin American country compared to those with high English proficiency scores. According to Wallace et al. [40], language and cultural barriers were two of several problems encountered by Mexican immigrants when accessing healthcare services in the United States. They specifically found limited English proficiency to be associated with seeking medical and dental care in Mexico. In a more general study on U.S. immigrants, Ku and Matani identified language problems as the primary barrier to child health services in the U.S. by Latino parents [28]. Similarly, De Gagne et al. examined healthcare experiences of Korean immigrants living in North Carolina [8]. They found language barriers to be among the main impediments to seeking care in the U.S., thus prompting some to opt for seeking care in their native country, especially those who were uninsured. Thus, we expect consumers who speak foreign languages to be less concerned about risk-related aspects of medical tourism such as safety while traveling, smooth transition to post-operative care, hospital accommodations or physician recommendations but they would be more concerned with social-related aspects such as language barrier, confidentiality of treatment or political and legal environments.

Ethnicity

Racial and ethnic disparities in health care access and quality have been extensively documented [32]. Some studies examined the influence of ethnicity and found that African Americans tended to consume less medical care than other large, self-identified ethnic groups [2][34]. In another study on racial disparities in health, the blacks were reported to have fewer visits for medical care, and they were less likely to have interaction with a specialist or to have surgery [41]. Another study by Lopez & Jha (2010) demonstrated that hospitals with a disproportionately high number of black patients had worse outcomes than other hospitals that served both white and black elderly patients. Such a disparity may affect the blacks' perceptions of hospitals' quality. On average, the blacks were more likely than the whites to have lower socioeconomic status and to self-report worse health status [25]. Consumers with lower incomes and less education tended to have lower expectations concerning medical standards, thus they may be less sensitive to the assurance of high quality of care or high standard of hospital accommodation, or be concerned with physician recommendation.

Hypotheses

Based on the aforementioned literature, we posed the following hypotheses on how certain consumer characteristics will influence consumer's perceptions of medical tourism.

H_1: *The well-insured consumers are more likely than the less-insured to be motivated by risk factors to travel abroad for care.*

H_2: *The better-educated are less likely than those with less education to be motivated by risk factors to travel abroad for care.*

H_{3a}: *Consumers who are proficient in a foreign language are less likely than those who speak only English to be motivated by risk factors to travel abroad for care.*

H_{3b}: *Consumers who are proficient in a foreign language are more likely than those who speak only English to be motivated by social-related factors to travel abroad for care.*

H_4: *The black consumers are <u>less</u> likely than the whites to be motivated by risk factors to travel for care.*

METHODOLOGY

This study is a subset of a bigger study of consumer behavior in medical tourism. It focuses on a smaller population subgroup: two geographically separated groups of college students. The data were collected by administering a previously developed questionnaire to face-to-face students in Economics and Marketing classes on two campuses – University of North Carolina-Pembroke (UNCP) and Western Illinois University (WIU) between March 2013 and May 2014. The study was approved by the Institutional Review Board (IRB) of UNCP. The main question from the survey asks "If you ever need a major surgery (e.g., a knee replacement), how important would the following factors be in influencing your decision to seek treatment abroad?" followed by fifteen perception statements with a 5-point Likert scale response. The survey yielded a total of 401 usable responses.

We analyzed the data using principal-components analysis, and ordinary least-square regressions. The principal component analysis of the fifteen perception statements yielded a Kaiser-Meyer-Olkin (KMO) statistic of 0.859, Bartlett's test χ^2 (df = 105) = 1,903 (p-value = 0.000) and Cronbach's alpha of 0.822 (see Table 1). Three components had eigenvalues greater than 1, and a cumulative value that accounted for 55% of the variation in the data. A Varimax rotation yielded 3 major factors: risk, vacation, and social-related.

We then conducted analyses of variance (ANOVA) to examine the relationships between the three factors and the thirteen demographic variables. The consumer variables that had no effect on any of the factors were weeded out to address the multicollinearity concern. Next, we regressed each of the three factors on the remaining consumer variables. The resulting adjusted R-squares from the regression of the three components were 0.238 (risk), 0.093 (vacation), and 0.133 (social-related). Subsequently, similar regressions were run on the fifteen perception statements and the thirteen demographic variables.

TABLE 1.

Principal Component Loadings (n = 401)

Variable	Component		
	Risk	Vacation	Social
High quality of care	0.750		
Assurance of safe trip	0.716		
High standard of accommodation	0.703		
Assurance of smooth post-care	0.678		
Recommendation by U.S. doctors	0.454		
Taking a vacation		0.739	
Cash incentives, paid leave, travel costs		0.721	
Quicker treatment		0.691	
Non-traditional treatment		0.678	
Cost Saving		0.635	
Similar culture			0.728
Good infrastructure			0.610
Assurance of confidentiality & privacy			0.586
Political stability & sound legal system			0.583
International accreditation or affiliation	0.451		0.453
Eigenvalue	3.30	2.60	2.26
Percentage of variation	22.01	17.40	15.05
Cumulative Percentage	22.01	39.41	54.46
Cronbach's alphas (overall $\alpha = 0.822$)	0.784	0.751	0.733

Notes:
1) Principal component loadings after VARIMAX rotation.
2) We report loadings greater than 0.450.
3) KMO measure = 0.859. Bartlett's test of sphericity, χ^2 (df = 105) = 1902.8 (p = 0.000).

RESULTS AND DISCUSSION

The descriptive statistics of the sample used in this study are shown in Table 2. The overall regression results showed that the risk factor is the strongest motivating factor for consumers of various demographics to travel abroad for treatment, followed by the vacation and social-related factors (see Table 3). The results indicated that there were statistically significant mean differences among insurance status, “heard of medical tourism”, education, ethnicity, foreign language spoken for both the risk and vacation factors, and in addition to those aforementioned variables, gender, community, income for social-related factor.

TABLE 2.

Descriptive Statistics (n = 401)

	Total	Percentage
Location		
Illinois	214	53.3
North Carolina	187	46.7
Had heard of medical tourism		
No	245	61.0
Yes	156	39.0
Health status		
Excellent	237	59.1
Good	142	35.4
Fair or Poor	22	5.5
Insurance ownership and type		
Uninsured	22	5.4
Medicare	51	12.4
Medicaid	18	4.4
Military/TriCare	31	7.5
Employment-based group insurance	187	45.5
Individual standard-coverage plan	86	20.9
Individual low-cost health insurance (e.g. Mini-Med)	6	1.5
Other	10	2.4
Age group		
18 – 21 years	231	57.6
22 – 30 years	154	38.4
31 – 40 years	12	3.0
41 – 50 years	3	0.7
51 – 64 years	1	0.2
65 and older	0	0.0
Gender		
Male	242	60.3
Female	159	39.7
Marital status		
Married	34	8.5
Single	357	89.0
Divorced or separated	6	1.5
Widowed	1	0.2
Other	3	0.7
Ethnic group		
White	257	64.1
African American	79	19.7

Native American	19	4.7
Hispanic	15	3.7
Asian	11	2.7
Multi-racial or other	20	5.0
Education		
Professional or Graduate degree	6	1.5
Bachelor's degree	64	16.0
Associate's degree or some college	180	44.9
High School degree	149	37.2
Some high school or less	2	0.5
Foreign language proficiency		
None	315	78.4
Spanish	55	13.7
French	10	2.5
German	3	0.7
Other	19	4.7
Community		
Rural	121	30.2
Urban	83	20.7
Suburban/small sown	197	49.1
Annual household income		
$15,000 or less	124	30.9
$15,001 to $30,000	49	12.2
$30,001 to $50,000	59	14.7
$50,001 to $70,000	63	15.7
$70,001 to $100,000	46	11.5
$100,001 to $150,000	41	10.2
Above $150,000	19	4.7

Our results supported H_1. We found that consumers who were well-insured (employer-based, military or Medicare) were more sensitive to risk factors than those who were underinsured (Medicaid, MiniMed) or uninsured (p= 0.029) (see Table 3). Particularly, the underinsured were less sensitive than the well-insured or the uninsured to risk factors such as "post-operative care assured" (p=0.053).

As far as education is concerned, H_2 was supported. Those with graduate degrees were less sensitive to risk factors than those with bachelor degrees (p=0.044) or those with associate degrees (p=0.018) or those with high school or less education (p=0.068). Particularly, the graduate degree holders were less sensitive to "assurance of a safe trip" than bachelor degree (p=0.007) and associate degree holders (p=0.001) or those with high school or less education (p=0.002). Further, the graduate degree holders were also less sensitive to "assurance of post-care" than bachelor degree (p=0.002) or associate degree holders (p=0.008) or those with high

school or less education (p=0.044). The graduate degree holders were also less inclined than associate degree holders (p=0.047) to be motivated by "high standard of hospital accommodation".

The results also supported H_{3a}. Consumers who were proficient in a foreign language were less likely than those who speak only English to be motivated by risk factors to travel abroad for care. This was particularly true for consumers who speak German (p=0.0000). It especially applied to "physician recommendation" (p=0.000 for German, p=0.007 for French), "assurance of a safe trip" (p=0.000 for German, p=0.081 for French, p=0.099 for other non-Spanish foreign languages), and "assurance of smooth post-care" (p=0.003 for German). In this study, respondents with foreign language proficiency were likely to be international students or those who were interested in foreign culture or travel. In such cases, these consumers would be familiar with the care of the destination country, thus explaining their insensitivity to risk-related factors.

When it came to the social factor, consumers who spoke German were more likely than those who spoke only English to be motivated by social-related factors to travel abroad for care (p=0.046). This was particularly true in regards to "assurance of confidentiality and privacy" (p=0.078). Respondents who spoke non-Spanish foreign languages were also more sensitive than those who spoke only English to "political stability and a sound legal system" (p=0.035). However, we also found respondents who spoke Spanish (p=0.038) or French (p=0.102) to be less sensitive than those who spoke only English to the social factor, especially concerning "similar culture", although the latter effect was insignificant. Thus, H_{3b} is not well supported.
Furthermore, our results also supported H_4 since the blacks were less sensitive than the whites or other races to the risk factor (p=0.005). The blacks were especially less motivated than the whites by "assurance of high quality of care" (p=0.001); they were also less motivated than the whites, Asians or other races by "high standards of hospital accommodations" (p=0.030), and by "physician recommendation" (p=0.084).

Other Results

There were two other interesting variables, though we did not have hypotheses to explain them – gender and "having heard of medical tourism". The males were less sensitive than the females to the social-related factor (p=0.001), especially in "similar culture" (p=0.003), "good infrastructure" (p=0.004), and "assurance of confidentiality and privacy" (p=0.030).
The respondents who "have heard of medical tourism" were less sensitive than those who "have not heard" to both the vacation factor (p=0.005) and the social-related factor (p=0.035), but they were more sensitive than their counterparts to the risk factor (p=0.048). In terms of vacation-related perceptions, those who had heard of medical tourism were less motivated than those who had not by "taking a vacation" (p=0.001) and by "cash incentives, paid leave, and travel costs" (p=0.076).

TABLE 3.

Multiple Regressions of Three Components (n = 401)

	Risk		Vacation		Social-Related	
	coeff	p	coeff	p	coeff	p
Constant	-4.852***	0.000	-0.782	0.064	-0.820	0.140
Had Heard of Medical Tourism						
Yes	0.187*	0.048	-0.288**	0.005	-0.212*	0.035
No [b]						
Had Travelled for Medical Tourism						
Yes			0.501	0.143		
No [b]						
Location						
UNC Pembroke			0.136	0.213	0.126	0.256
Western Illinois U [b]						
Insurance (not mutually exclusive)						
Employer-based group			-0.438**	0.009		
Military/TriCare	0.301*	0.029	-0.272	0.234	0.190	0.302
Medicare			-0.526**	0.009		
Medicaid					-0.306	0.193
Minimed					-0.942*	0.017
Individually purchased			-0.476**	0.008		
Other health insurance			-0.972**	0.004	-0.392**	0.009
Uninsured [b]						
Health Status						
Fair or Poor	-0.332	0.088			0.127	0.128
Good or Excellent [b]						
Age Group						
18 to 21	-0.203*	0.039				
22 or older [b]						
Marital Status						
Single (never married)	1.705	0.055				
Married	1.862*	0.039				
Divorced or separated, or other	1.693	0.078				
Widowed						
Racial/Ethnic Group						
Blacks	-0.323**	0.005	0.174	0.176	0.213	0.096
Native Americans	-0.326	0.123			0.488*	0.043
Asians			-0.588	0.054	0.375	0.215
Multi-racial or other			0.449*	0.046		
Whites [b]						
Gender						
Male	-0.121	0.194	0.156	0.124	-0.336**	0.001
Female [b]						
Foreign Language (not mutually exclusive)						
French	-0.348	0.226			-0.461	0.136
German	-2.333***	0.000			1.115*	0.046
Spanish			0.210	0.134		
Other foreign language [b]						
None [b]						

Type of Community						
Urban					-0.259*	0.027
Rural/Suburban/Small town [b]						
Education Level						
High school or less	0.686	0.068			-0.764	0.058
Assoc. Arts or some college	0.884*	0.018	-0.274*	0.042	-0.785	0.051
Bachelor's degree	0.771*	0.044			-0.692	0.091
Graduate or professional [b]						
Income						
$30,000 or less [b]						
$30,001 to $50,000					0.161	0.239
$50,001 to $70,000 [b]						
$70,001 to $100,000					0.200	0.190
$100,001 to $150,000					0.465**	0.004
$150,001 or more [b]						
Perception Rating Average [d]	0.607***	0.000	0.261**	0.003	0.413***	0.000
F statistic	8.803***	0.000	3.732***	0.000	4.229***	0.000
df for F	16, 384		15, 385		19, 381	
Adjusted R^2	0.238		0.093		0.133	

*** p < 0.001, ** p < 0.010, * p < 0.050. n = 401,

a. Asians, Hispanics, and others were represented by a single dummy variable in the Risk Factor regression.

b. Although dummy variables for these categories were never used in the regressions, they are included here to list all of the categories for each variable. These categories, along with any categories omitted from the regressions, constitute the baselines.

c. Foreign language other than French, Spanish, or German. Chinese, and Arabic were common among the other languages named by respondents.

d. The perception rating average for a component is an average of the Likert-scale ratings given by the respondents to a subset of the perception statements. In the case of the risk component, the average excludes the Likert ratings of the first five statements and the last statement in Table 1. For the vacation component, the second five statements were excluded, and for the social component the last five statements were excluded.

CONCLUSION

Our paper identified demographic groups who were likely to participate in medical tourism and further identified three factors (risk, vacation, and social-related) that explain their motivation to travel abroad for treatment. In addition to confirming and contrasting hypotheses that exist in the previous literature, our study shed light on the links between medical tourism and variables that have not been studied previously such as education, ethnicity, foreign language spoken, and whether one has heard of "medical tourism". From managerial perspectives, marketing strategies for industry participants such as the medical tourism facilitators (MTFs) can be derived from this study and implemented. For instance, the study helps MTFs to segment their consumers by demographics so they can duly refine their marketing strategies by emphasizing individual aspects of each motivating factor, whether they are sensitive to the assurance of a smooth post-operative care, high quality care in the risk factor or to good infrastructure or similar culture of a destination country, or the assurance of confidentiality and privacy in the social-related factor. Furthermore, this study can help the employers and insurance companies who are particularly interested in cost saving to redesign appropriate economic incentives to encourage consumers'

participation in medical tourism. Furthermore, in their search for a partnership with foreign hospitals, our study can help them look for the specific risk (medical, travel, financial) or social or vacation aspects of the medical tourism that would be valued the most by various consumer groups.

It is believed that medical tourism will continue to grow in the U.S. for three reasons. First, over 20 million uninsured Americans have gained health insurance since the passage of ACA in 2010, and the numbers of uninsured Americans are expected to continue to fall as the penalty for non-participation increases. This may result in shortage of doctors (especially of the primary care physicians) who would be needed to serve the newly insured. This is particularly so given that "seven million people live in areas where the expected increase in demand for providers is greater than 10 percent of baseline supply, and forty-four million people live in areas with an expected increase in demand above 5 percent of baseline supply" [23]. The shortages of doctors may result in higher fees for medical care. Second, the fact that the PPACA mandates the coverage of more treatments, such as pre-existing conditions and mental health, is likely to also result in higher premiums for consumers. So, although more Americans will have adequate health insurance, both situations may induce many employers and consumers to find cheaper alternatives, which may include seeking treatment abroad. Competition may force private insurance companies or brokers to be innovative in their offering of products and services, which may lead them to include the coverage of treatments outside the country in their policies for employers and for individuals.

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Perspectives on Statistics Instruction for Analytics and Data Science,

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URL for the Curriculum Guidelines for Undergraduate Programs in Data Science:
https://www.amstat.org/asa/files/pdfs/EDU-DataScienceGuidelines.pdf

POSTERIOR WORST-CASE BOUNDS FOR LPT SCHEDULES

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ABSTRACT

This paper proposes and analyzes a posterior tight worst-case bound for the Longest Processing Time (*LPT*) heuristic for scheduling independent jobs on identical parallel machines to minimize the makespan, and makes remarks that improve the well-known posterior worst-case bounds previously proposed in the literature when the makespan is realized on multiple machines. Our theoretical and computational comparative analysis shows that the proposed bound can complement the well known posterior bounds to synergistically achieve a better posterior worst-case bound for the *LPT* heuristic. Moreover, the proposed bound can be used to further show that *LPT* schedules are asymptotically optimal.

1. INTRODUCTION

The paper considers the classic problem of identical parallel machine scheduling with the objective of minimizing the makespan, $P \mid\mid C_{max}$ for short, see Graham et al. (1979). In $P \mid\mid C_{max}$, a set $J = \{1, ..., j, ..., n\}$ of n simultaneously available independent jobs, with processing times $p_j > 0, j \in J$, are scheduled on a set $M = \{1, ..., i, ..., m\}$ of m identical machines. Each machine can process at most one job at a time, and each job must be processed without interruption by exactly one of the m machines. It is supposed that $n > m \geq 2$ to avoid trivialities. The goal is to allocate every job to exactly one machine, so that the makespan, i.e., maximum time required by any of the machines to complete all the jobs, is minimized.

$P \mid\mid C_{max}$ is strongly NP-Hard for an arbitrary $m \geq 2$, see Garey and Johnson (1979), and it is one of the most studied problems from the viewpoint of approximation algorithms. Many polynomial time algorithms, having a known worst-case performance ratio, have been developed for $P \mid\mid C_{max}$, see Cheng and Sin (1990), Lawler et al. (1993), Chen et al. (1998), and Mokotoff (2001) for an overview. The first important approach is *List Scheduling*, see Graham (1966, 1969), that includes *Largest Processing Time* (*LPT*). Other known constructive methods are *MultiFit* (*MF*), see Coffman et al. (1978), *Largest Differencing Method* (*LDM*), see Karmarkar and Karp (1982), and *Multi-Subset*, see Dell'Amico and Martello (1995). A more recent algorithm, that is based on the idea of combining iteratively partial solutions, is described in Paletta and Pietramala (2007) and Paletta and Vocaturo (2010).

This paper deals with the worst-case approximation ratio of the *LPT* heuristic that considers the jobs sorted in non-increasing order with respect to their processing times, and iteratively assigns each job to the least loaded machine. Let C_{max}^{LPT} be the value of the makespan given by *LPT* heuristic, and C_{max}^{*} be the optimal value of the makespan. Analysis of the worst-case performance of the *LPT* rule was done by Graham (1966, 1969), Coffman and Sethi (1976), Chen (1993), Blocher and Chand (1991), and Blocher and Sevastyanov (2015).

Graham (1966, 1969) computes the performance guarantee ratio of the *LPT* heuristic as

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} \leq 1 + \frac{m-1}{3m}.$$

Coffman and Sethi (1976) establish the first posterior worst-case ratio:

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} \leq 1 + \frac{m-1}{mk},$$

where k is the number of jobs assigned to the makespan machine (i.e., the machine where the makespan takes place).

Chen (1993) perfects this posterior worst-case ratio by proposing:

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} = \begin{cases} = 1 & \text{if } k = 1 \\ \leq \frac{4}{3} - \frac{1}{3(m-1)} & \text{if } k = 2 \\ \leq 1 + \frac{m-1}{mk} & \text{if } k \geq 3. \end{cases}$$

Blocher and Sevastyanov (2015) propose the following posterior worst-case ratio:

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} = \begin{cases} = 1 & \text{if } K = 1 \\ \leq \frac{4}{3} - \frac{1}{3(m-1)} & \text{if } K = 2 \\ \leq 1 + \frac{m-1}{mK} & \text{if } K \geq 3, \end{cases}$$

where K ($K \geq k$) is the maximum number of jobs on a machine in the truncated *LPT* schedule, i.e., in the *LPT* schedule obtained by assigning the first l jobs and neglecting the remaining jobs, where l is the index of the last job inserted in the makespan machine of the *LPT* schedule.

Observing that in three particular cases

i. $k = 1$
ii. $m = 2$ and $k = 2$
iii. $m \geq 3$, $k = 2$, and $K \leq 3$

the Chen bound is better than the Blocher and Sevastyanov bound, thus the latter bound can be perfected by considering:

- for $m = 2$

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} = \begin{cases} = 1 & \text{if } k \leq 2 \\ \leq 1 + \frac{m-1}{mK} & \text{if } K \geq k \geq 3, \end{cases}$$

- for $m \geq 3$

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} = \begin{cases} = 1 & \text{if } k = 1 \\ \leq \frac{4}{3} - \frac{1}{3(m-1)} & \text{if } k = 2 \text{ and } K \leq 3 \\ \leq 1 + \frac{m-1}{mK} & \text{otherwise.} \end{cases}$$

Blocher and Chand (1991) propose the posterior worst-case ratio:

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} \leq \frac{C_{max}^{LPT}}{p_l \alpha^l},$$

where

$$\alpha^l = \left\lceil \frac{\sum_{i=1}^{l} \lfloor p_i/p_l \rfloor}{m} \right\rceil$$

is the number of jobs assigned to a makespan machine of the optimal schedule for the relaxed problem obtained by considering m machines and $\sum_{j=1}^{l} \left\lfloor \frac{p_j}{p_l} \right\rfloor$ jobs each of them having identical processing time equal to p_l. Here $\lceil x \rceil$ denotes the smallest integer not less than x, and $\lfloor x \rfloor$ denotes the largest integer not greater than x.

This paper provides the posterior tight worst-case performance ratio

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} \leq 1 + \frac{m-1}{\rho},$$

where

$$\rho = \frac{1}{p_l} \sum_{j=1}^{l} p_j$$

represents the ratio between the total processing time of the first l jobs and the processing time p_l of job l, and then it compares this bound with the existing posterior tight worst-case bounds on *LPT* schedule. This paper also provides remarks to improve the well-known posterior worst-case bounds when the makespan is realized on multiple machines. Moreover, by using the new bound, this paper provides a further proof that *LPT* schedule is asymptotically optimal for $n \to \infty$. Excellent results regarding the asymptotical optimality of *LPT* schedules are provided in Ibarra and Kim (1977) and, by using the probabilistic analysis (see Coffman et al. 1988) in Frenk and Rinnooy Kan (1986, 1987).

2. A POSTERIOR TIGHT WORST-CASE PERFORMANCE RATIO

Let r be the machine that determines the makespan on an *LPT* schedule, and l be the index of the last job inserted in r. Let C_i be the time employed by the machine i, $i = 1, ..., m$, to perform the set of jobs assigned to it by the *LPT* heuristic before assigning job l, i.e., by excluding the last $n - l + 1$ jobs. It is well known that the *LPT* schedule satisfies:

$$C_{max}^{LPT} = C_r + p_l$$

and

$$C_r \leq \frac{1}{m} \sum_{j \in N - \{l\}} p_j = \frac{1}{m} \sum_{j \in N} p_j - \frac{1}{m} p_l \leq C_{max}^{*} - \frac{1}{m} p_l. \quad (1)$$

Since the jobs are indexed so that $p_1 \geq ... \geq p_n$, and $mC_{max}^{*} \geq \sum_{j=1}^{n} p_j \geq lp_l$, it follows that

$$p_l \leq \frac{m}{l} C_{max}^{*}.$$

Moreover, by using the parameter ρ that has been introduced by Massabó et al. (2015) in a uniform machine environment as the ratio between the total processing time of the first l jobs and the processing time of job l

$$\rho = \frac{1}{p_l}\sum_{j=1}^{l} p_j,$$

we have that $l \leq \rho$ because $p_1 \geq p_2 \geq \ldots \geq p_l$, and then

$$p_l = \frac{1}{\rho}\sum_{j=1}^{l} p_j \leq \frac{m}{\rho} C^*_{max}. \tag{2}$$

Theorem 1. The makespan obtained by the *LPT* heuristic satisfies

$$\frac{C^{LPT}_{max}}{C^*_{max}} \leq 1 + \frac{m-1}{\rho}.$$

Proof. Since

$$C^{LPT}_{max} = C_r + p_l,$$

by (1) and (2) it follows that

$$C^{LPT}_{max} \leq C^*_{max} + \frac{m-1}{m} p_l \leq C^*_{max} + \frac{m-1}{m}\frac{m}{\rho} C^*_{max}$$

and then

$$\frac{C^{LPT}_{max}}{C^*_{max}} \leq 1 + \frac{m-1}{\rho},$$

which is the bound stated in the theorem.

Theorem 2. For each instance that satisfies the following properties:

1) $C^*_{max} = \frac{1}{m}\sum_{j=1}^{n} p_j$, and
2) $C^{LPT}_{max} = \frac{1}{m}\sum_{j=1}^{n-1} p_j + p_n$

LPT makes the bound $1 + \frac{m-1}{\rho}$ tight.

Proof. For each instance that satisfies the properties 1) and 2), the *LPT* heuristic gives $l = n$ and $C^{LPT}_{max} - C^*_{max} = p_n - \frac{p_n}{m}$, thus

$$\frac{C^{LPT}_{max}}{C^*_{max}} = 1 + \frac{p_n - \frac{p_n}{m}}{\frac{1}{m}\sum_{j=1}^{n} p_j} = 1 + \frac{p_n m - p_n}{\sum_{j=1}^{n} p_j} = 1 + \frac{m-1}{\frac{1}{p_n}\sum_{j=1}^{n} p_j} = 1 + \frac{m-1}{\rho}.$$

This proves the theorem.

The following two classes of instances that satisfy the properties of Theorem 2 show that the posterior worst-case bound $1 + \frac{m-1}{\rho}$ is tight.

Class 1 (from Graham, 1969). Consider the set of $n = 2m + 1$ jobs with processing times:
- $p_i = 2m - \left\lceil \frac{i}{2} \right\rceil$, for $i = 1, ..., 2m$, and
- $p_{2m+1} = m$.

The *LPT* schedule yields $C_{max}^{LPT} = 4m - 1$ whereas $C_{max}^{*} = 3m$, therefore

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} = \frac{4m-1}{3m}.$$

Now, the *LPT* schedule has $l = n$, $p_l = m$, $\sum_{j=1}^{l} p_j = 3m^2$, hence $\rho = 3m$, therefore

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} = \frac{4m-1}{3m} = 1 + \frac{m-1}{\rho}.$$

Class 2. Consider the set of $n = 2\left\lceil \frac{m}{2} \right\rceil m + 1$ jobs with processing times:
- $p_1 = m + 2\left\lceil \frac{m}{2} \right\rceil$ and for $k = 1, ..., \left\lceil \frac{m}{2} \right\rceil$,
- $p_j = p_1 - (2k - 1)$ for $j = 2m(k-1) + 2, \ldots, 2mk - 1$, and
- $p_{2mk} = p_{2mk+1} = p_1 - 2k$.

The *LPT* schedule yields $C_{max}^{LPT} = 2\left\lceil \frac{m}{2} \right\rceil \left(m + \left\lceil \frac{m}{2} \right\rceil\right) + m$ whereas $C_{max}^{*} = 2\left\lceil \frac{m}{2} \right\rceil \left(m + \left\lceil \frac{m}{2} \right\rceil\right) + 1$, thus

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} = \frac{2\left\lceil \frac{m}{2} \right\rceil \left(m + \left\lceil \frac{m}{2} \right\rceil\right) + m}{2\left\lceil \frac{m}{2} \right\rceil \left(m + \left\lceil \frac{m}{2} \right\rceil\right) + 1} = 1 + \frac{m-1}{2\left\lceil \frac{m}{2} \right\rceil \left(m + \left\lceil \frac{m}{2} \right\rceil\right) + 1}.$$

Observing that the *LPT* schedule has $l = n$, $p_l = m$, and $\sum_{j=1}^{l} p_j = m\left[2\left\lceil \frac{m}{2} \right\rceil \left(m + \left\lceil \frac{m}{2} \right\rceil\right) + 1\right]$, so $\rho = 2\left\lceil \frac{m}{2} \right\rceil \left(m + \left\lceil \frac{m}{2} \right\rceil\right) + 1$, therefore

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} = 1 + \frac{m-1}{2\left\lceil \frac{m}{2} \right\rceil \left(m + \left\lceil \frac{m}{2} \right\rceil\right) + 1} = 1 + \frac{m-1}{\rho}.$$

By using our bound it is easy to prove that the *LPT* schedules are asymptotically optimal for $n \to \infty$.

Theorem 3. Given n jobs, if it exists an appropriate integer value s such that $p_h < \sum_{j=h+1}^{n} p_j$ for each $h = 1, ..., n - s$, then

$$\frac{C_{max}^{LPT}}{C_{max}^{*}} \to 1$$

when $n \to \infty$.

Proof. If $p_h < \sum_{j=h+1}^{n} p_j$ for each $h = 1, ..., n - s$, when $n \to \infty$ also l and $\rho \to \infty$, therefore $\frac{C_{max}^{LPT}}{C_{max}^{*}} \leq 1 + \frac{m-1}{\rho} \to 1$.

A particular class of instances that satisfies the condition $p_h < \sum_{j=h+1}^{n} p_j$, for each $h = 1, ..., n - s$, it is obtained when $p_n \geq \frac{1}{n^{\gamma}}$ with $0 < \gamma \leq 1$.

2.1 Theoretical Comparison Between the Bounds

It is important to compare theoretically our bound with the existing posterior bounds. By comparing our bound with the Blocher and Sevastyanov bound, we obtain

$$1 + \frac{m-1}{mK} \leq 1 + \frac{m-1}{\rho} \text{ when } K \geq \frac{\rho}{m},$$

on the contrary

$$1 + \frac{m-1}{mK} \geq 1 + \frac{m-1}{\rho} \text{ when } K \leq \frac{\rho}{m}.$$

By comparing the Blocher and Chand bound with our bound, we obtain that

$$\frac{C_{max}^{LPT}}{p_l \alpha^l} \leq 1 + \frac{m-1}{\rho} \text{ when } \alpha^l \geq \frac{\rho C_{max}^{LPT}}{p_l(\rho + m - 1)},$$

on the contrary

$$\frac{C_{max}^{LPT}}{p_l \alpha^l} \geq 1 + \frac{m-1}{\rho} \text{ when } \alpha^l \leq \frac{\rho C_{max}^{LPT}}{p_l(\rho + m - 1)}.$$

These comparisons show that our worst-case bound can complement the existing worst-case bounds to synergistically achieve a better bound.

Remark. Coffman and Sethi, Chen, Blocher and Chand, and Blocher and Sevastyanov papers do not provide any guideline in case there are multiple machines that yield the maximum completion time. Observing that when the makespan is realized on multiple machines, and if L is the set of indexes of the last jobs inserted in the makespan machines, we conclude that:

- our bound, and the Blocher and Sevastyanov bound can be improved by using the largest index l belonging to L;
- the Blocher and Chand bound can be improved by using the l that makes maximum $p_l \cdot \alpha^l$, i.e., $l = \arg\max_{j \in L}\{p_j \cdot \alpha^j\}$; and
- the Coffman and Sethi, and Chen bounds do not depend on the index l, but they can be improved by using the largest number of jobs assigned to the makespan machines.

2.2 Computational Study

This section presents a series of computational experiments conducted to evaluate the performance of our posterior worst case bound (HMPT) relative to the bounds proposed by Blocher and Chand (BC), and by Blocher and Sevastyanov (BS), and to evaluate the considerations made when the makespan is realized on multiple machines. The Chen bound that perfects Coffman and Sethi bound was not considered because it is dominated by the Blocher and Sevastyanov bound. The computational experiments used the UNIFORM family of instances that have been presented in França et al. (1994).

The instances are characterized by three parameters used to randomly generate the integer processing times: the number of machines $m \in \{5, 10, 25\}$, the number of jobs $n \in \{50, 100,500, 1000\}$ and the processing time interval $D \in \{[1, 100], [1, 1000], [1, 10000]\}$. For each of 36 combinations of m, n, and D, there exist 10 instances for a total of 360 instances.

According to our computational results, HMPT gives the lowest (best) average bound equal to 1.042, and the largest (best) average number of best bounds equal to 0.881, corresponding to 317 instances out of 360; BC gives an average bound equal to 1.075, and an average number of best bounds equal to 0.131 corresponding to 47 instances; while BS gives an average bound equal to 1.085, and an average number of best bounds equal to 0.017 corresponding to 6 instances.

3. CONCLUSION

This paper provides the posterior worst-case bound $1 + \frac{m-1}{\rho}$, where $\rho = \frac{1}{p_l}\sum_{j=1}^{l} p_j$, and l is the largest index of the latest jobs inserted in the makespan machine, and shows that this bound is tight. It is shown, both theoretically and computationally, that our worst-case performance ratio can complement the existing bounds to synergistically achieve a better bound. This paper also provides some remarks that improve the well-known posterior worst-case bounds. Moreover, our bound can be used to further show that *LPT* schedules are asymptotically optimal for $n \to \infty$.

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PREDICTING IMDB SCORE: AN APPLICATION OF DECISION TREES

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ABSTRACT

The purpose of this project is to identify film attributes that influence the Internet Movie Database rating of a movie. Internet Movie Database or IMDb, is a searchable database that has a plethora of data about movies and various entertainment programs and the IMDb rating can be used to measure the success of a movie. The goal of this research is to determine what factors, such as a film's cast and crew or social media popularity, have a large impact on the IMDb rating. This was done using a data mining tool called Microsoft SQL Server Analysis Services (SSAS). A decision tree algorithm was applied to the dataset. This project will provide valuable information about which factors influence movie watching decisions.

INTRODUCTION

IMDb offers a searchable database of more than 185 million data items including more than 3 million movies, television and entertainment programs and more than 6 million cast and crew members [1]. It is a tool that can be utilized to find information on a movie to help us make a movie watching decision. The IMDb data subset we opted to use for our project had over 5000 records and was compiled by data scientist chuansun76 in August of 2016. The data set looks at 5043 movies and identifies 28 attributes of the movies ranging from whether the movie was color or black and white to how many likes the movie got on Facebook. We decided to use this data set to try to determine what attributes of a movie helped determine the IMDb rating as a measure of success for a movie.

We plan to explore the impact of social media (via Facebook "likes") on a movie's IMDb score. We will use the Decision Trees algorithm to discover if our hypothesis can be verified. We will also utilize the Cross Industry Standard Process for Data Mining techniques (CRISP-DM) for our project which includes:

1. Business Understanding
2. Data Understanding
3. Data Preparation
4. Modeling
5. Evaluation
6. Deployment

LITERATURE REVIEW

The literature review section contains information pertaining to previous work related to the IMDb database as well as the data mining algorithms that were used in this research. It also provides an overview of the Cross Industry Standard Process for Data Mining techniques (CRISP-DM), the methodology employed in the paper.

Previous Work

There has been some work in the past related to mining the IMDb database or some subset thereof. We found a group that worked on a set and published their findings with Wessex Institute Press as well as with IEEE. Both groups expressed that this data set, with its attributes, is difficult to mine. Both sought to predict what measure of success a movie had either in revenue or IMDb scores. Both had similar experiences with which factors ended up being significant in their predictions [3]. They used the following algorithms to mine the data: Decision Trees, Linear Regression, Logistic Regression, and Neural Networks.

In 2014 it was stated that, "Knowing which movies are likely to succeed and which are likely to fail before the release could benefit the production houses greatly as it will enable them to focus their advertising campaigns which itself cost millions of dollars, accordingly" [3]. So they set out to predict the success of a movie at the box office using Logistic and Linear Regression.

In their study they attempted to use IMDb data to predict the gross revenue of the movies as well as their IMDb rating. Unlike our dataset, they only used movies that were released between 2000 and 2012 in the United States and in English. Their data set contained 1050 films. Like us, their data was susceptible to noisy, missing and inconsistent data. They solved the problem of missing data by using mean and median as central tendency for the attribute. They looked closely at correlation of the different attributes to get the data as tight as possible to avoid redundancy and irrelevant attributes.

They generated gross revenue predictions from their Linear Regression model. They changed the problem to a classification problem with their Logistics Regression model and binned movie revenues for prediction. Their results varied from 42.2% accurate with Logistic Regression to about 51% accurate with Linear Regression. They found that budget, director, writers, actors, and gender were significant features in their predictions. Which was similar to what the first group found when predicting perceived success of a movie [3].

Another team worked on a subset of the IMDb database with similar concerns and results. In their 2014 conference paper, the assertion that IMDb scores were predictable based on budget size was not supported[4]. They also found that there seemed to be a downward trend in the quality of films over time. Their study found that when predicting ratings the most significant attributes were the cast and directors of a film.

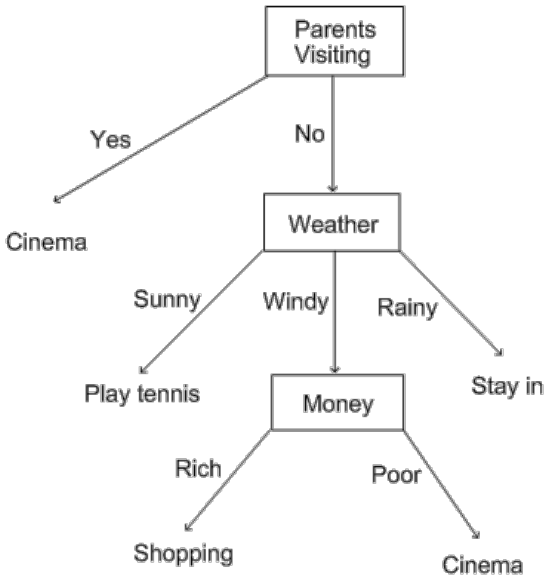
This group needed to transform some of the data, as will we, in order to perform their mining in Neurosoft Envisioner and Microsoft Excel. They transformed selected text attributes into a numerical format to facilitate their mining. They also had to make decisions about which attributes would be kept and which would be discarded based on what would work in their model. The group also considered which attributes would likely produce meaningful results. After defining some other parameters, they went on to classify the data into four categories: Excellent, Average, Poor and Terrible with their respective score. From there they started to analyze their theories on budget, actors, directors and time.

Overall, they found that it was difficult to apply data mining techniques to the data in the IMDb. The data needed to be extensively cleaned and integrated. Additionally, much of the data was text rather than numerical, which made mining more difficult. Despite these problems, they performed some useful data mining on the IMDb data, and uncovered information that could not be seen by browsing the regular web front-end to the database [4].

Data Mining Algorithms

The decision tree algorithm is a supervised model. The supervised model uses a decision tree as a predictive model that maps observations about an item to conclusions about the item's target value [5]. A decision tree is built by determining the correlations between an input and the targeted outcome. After all the attributes have been correlated, the algorithm identifies the single attribute that most cleanly separates the outcomes. This point of the best separation is measured by using an equation that calculates information gain. The attribute that has the best score for information gain is used to divide the cases into subsets. In Figure 1, we can see that a decision tree is helpful when predicting the outcome of what to do (go shopping, go the movies, play tennis or stay in) based on the attributes of whether or not the parents are visiting, the weather and how much money you have. The tree is comprised of a root node, branches and leaves. For our study, the root node will contain the total number of cases that will be used to predict the IMDB score, such as actor 1 Facebook likes, actor 2 Facebook likes, etc. The branches are used to filter the cases that will ultimately produce the leaves, which in this instance is the IMDB score for each movie.

Figure 1: Decision Tree Example



(http://study.com/academy/lesson/what-is-a-decision-tree-examples-advantages-role-in- management.html)

CRISPM-DM

In order to successfully discover if our hypothesis can be verified, we will utilize the Cross Industry Standard Process for Data mining technique (CRISP-DM). The steps in the CRISP-DM are

- **Business Understanding**- This initial phase focuses on understanding the project objectives and requirements from a business perspective, and then converting this knowledge into a data mining problem definition, and a preliminary plan designed to achieve the objectives. In our case we hope to understand what impacts IMDb ratings to possibly shed light on what makes a movie successful.
- **Data Understanding**- The data understanding phase starts with an initial data collection and proceeds with activities in order to get familiar with the data, to identify data quality problems, to discover first insights into the data, or to detect interesting subsets to form hypotheses for hidden information. The attributes in our data set made us think of the all of the decisions movie makers must decide when bringing a film to the screen. It made us question which of the decisions contributed the most to the success of any given movie.
- **Data Preparation**-The data preparation phase covers all activities to construct the final dataset from the initial raw data. Tasks include table, record, and attribute selection as well as transformation and cleaning of data for modeling tools. Our data was messy and complicated and had to be cleaned up for all of our models.
- **Modeling**- In this phase, various modeling techniques are selected and applied, and their parameters are calibrated to optimal values. Because of the complicated attributes in our set we started by running a clustering algorithm and discovered that we would have to widen some parameters on our supervised models in order to capture any significant information.

- **Evaluation**- At this stage in the project you have built a model (or models) that appear to be of high quality from a data analysis perspective. At the end of this phase, a decision on the use of the data mining results should be reached. We decided to use both supervised and unsupervised models for both sorting and predicting and because we have equal parts of numeric and categorical data we will look for results from several different supervised models.
- **Deployment**- Depending on the requirements, the deployment phase can be as simple as generating a report or as complex as implementing a repeatable data scoring (e.g. segment allocation) or data mining process. From our exploration we will try to repeat significant findings across several models and then show those results side by side.

DESCRIPTION OF DATA SET

The IMDB data set we opted to use in this project had over 5000 records and was compiled by a data scientist in August of 2016. The 28 attributes in this data set are varied with several different data types that include both categorical and numerical. We spent time analyzing the data as well as examining it for the noisy and missing data which can affect some data mining algorithms. Table 1 shows the list of the independent variables relevant to this study as determined by Microsoft SQL Server Analysis Services (SSAS) algorithm as well as the dependent variable along with their meaning and data type. This algorithm can be utilized to determine the most relevant variables. We will apply a decision tree to this data set. IMDb score is the dependent variable.

METHODOLOGY

The data set contains 5000+ records, therefore we will have a substantial training and test set of data. We have decided to use the decision tree algorithm to make our predictions because it's a supervised model, meaning that the model splits data according to its' significant to an output. We also chose to apply the decision tree algorithm to our dataset because this is the best algorithm for categorical data.

We looked at our data in an effort to clean it up so we could make some determinations on what types of algorithms would be best to make our predictions. We had 5043 records in our initial data set, of which 125 were exact duplicates which we eliminated outright leaving us with 4918. We identified that 1034 of those records included missing cells in the columns that we were using as our input variables and we had to remove those records since decision trees cannot handle missing data. This leaves us with 3884 cases that will be used in determining the output.

As decision trees work better with categorical data, all continuous variables in Table 1 were binned in order to prepare the data for the decision tree. The IMDB score was binned according to Table 2. The binning of the various variables related to Facebook likes was done by creating categorical labels such as "Over 1G" for over 1000 likes or "Equal to or less than 500" for 500 or less Facebook likes.

Table 1: Summary of relevant variables

Attribute	Meaning	Data Type
MovieID	Primary Key	Integer
Actor_1_facebook_likes (independent)	Categorical range of Facebook likes the 1st actor has received	Continuous
Actor_2_facebook_likes (independent)	Categorical range of Facebook likes the 2nd actor has received	Continuous
Actor_3_facebook_likes (independent)	Categorical range of Facebook likes the 3rd actor has received	Continuous
Content Rating (independent)	Movie rating e.g. G, PG, PG-13, R	Categorical
Country (independent)	Country where movie was made/released	Categorical
Director_facebook_likes (independent)	Categorical range of Facebook likes the Director has received	Continuous
Movie_facebook_likes (independent)	Categorical range of Facebook likes the movie has received	Continuous
Title Year (independent)	Year the movie was made	Continuous
IMDB_score (dependent)	Score from IMDb	Continuous

Table 2: Binning IMDB Score

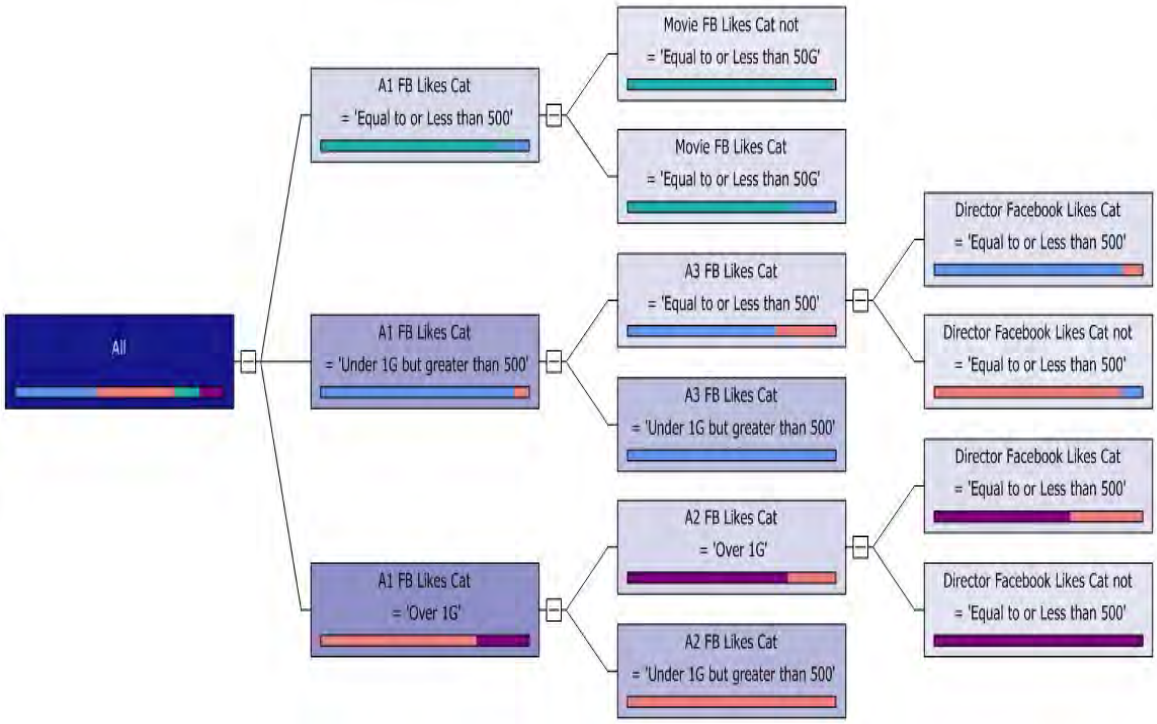
IMDB Score	Label
7.9-10	Excellent
6.6-7.8	Good
5.3-6.5	Average
5.3	Poor

RESULTS

We used Decision Trees in Microsoft SQL Server Analysis Services (SSAS) 2014 to build our data mining models. We discuss the results of the decision tree model in this section.

In the decision trees we used 70% of the data for training and held out 30% for testing. This left a sufficient amount of data in the training set with respect to the number of instances to the number of variables in the model as the data set was sufficiently large. The decision tree model is shown in Figure 2.

Figure 2: Decision Tree Model

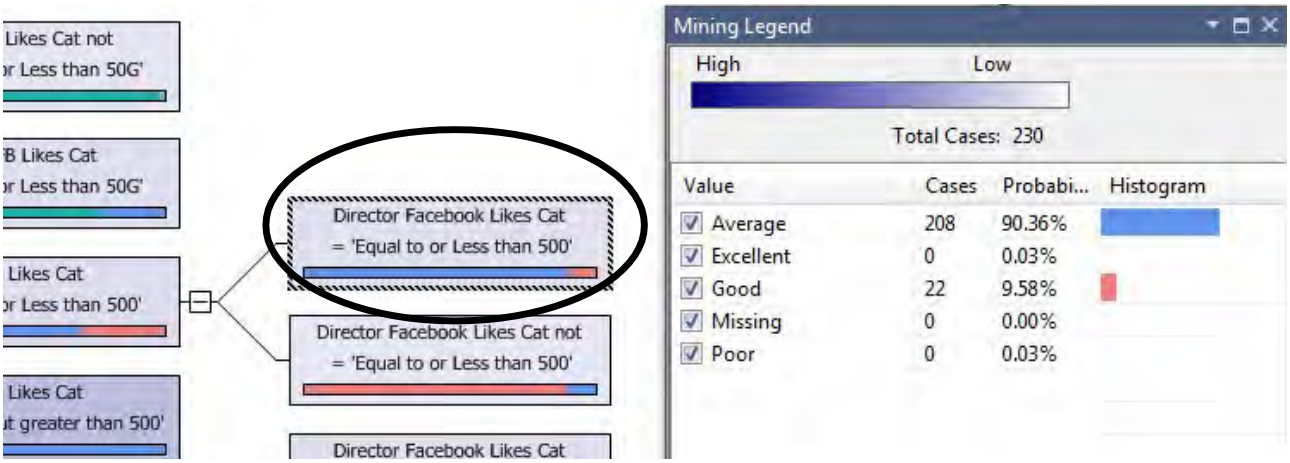


The tree can be read by starting at the root of the tree and following each node to the end. Each splitting attribute places each case into a particular category. At the end of each node, there is a breakdown of the IMDb ratings for all the cases in that leaf. The IMDb rating that has the majority of the cases in that leaf is the consequent of that rule. An example of a rule is as follows based on Figure 3:

> IF A1 FB Likes Cat = 'Under 1G but greater than 500' AND A3 FB Likes Cat = 'Equal to or Less than 500' AND Director Facebook Likes Cat = 'Equal to or Less than 500' THEN IMDb Rating = Average.
>
> Which can also be read as: If Actor 1 had 500-1000 Facebook likes and Actor 3 had 500 or less Facebook likes and the Director had 500 Facebook likes or less, then the IMDb rating is most likely going to be Average.

Each rule also shows the accuracy and coverage associated with it. Accuracy of a rule is the, “fraction of records that satisfy the antecedent that also satisfy the consequent of the rule” [2]. Coverage of a rule is the, “fraction of records that satisfy the consequent of a rule that also satisfy the antecedent of the rule” [2].

Figure 3: Rule Example with Legend



From the tree we were able to produce the following rules:

1. IF A1 FB Likes Cat = 'Equal to or Less than 500' AND Movie FB Likes Cat not = 'Equal to or Less than 50G' THEN IMDb Rating = Poor.

   Accuracy = 100% Coverage = 37.61%

2. IF A1 FB Likes Cat = 'Equal to or Less than 500' AND Movie FB Likes Cat = 'Equal to or Less than 50G' IMDb Rating = Poor.

   Accuracy = 78.16% Coverage = 62.39%

3. IF A1 FB Likes Cat = 'Under 1G but greater than 500' AND A3 FB Likes Cat = 'Equal to or Less than 500' AND Director Facebook Likes Cat = 'Equal to or Less than 500' THEN IMDb Rating = Average.

   Accuracy = 90.43% Coverage = 19.89%

4. IF A1 FB Likes Cat = 'Under 1G but greater than 500' AND A3 FB Likes Cat = 'Equal to or Less than 500' AND Director Facebook Likes Cat not = 'Equal to or Less than 500' THEN IMDb Rating = Good.

   Accuracy = 89.19% Coverage = 6.43%

5. IF A1 FB Likes Cat = 'Under 1G but greater than 500' AND A3 FB Likes Cat = 'Under 1G but greater than 500' THEN IMDb Rating = Average.

   Accuracy = 100% Coverage = 73.90%

6. IF A1 FB Likes Cat = 'Over 1G' AND A2 FB Likes Cat = 'Over 1G' AND Director

Facebook Likes Cat = 'Equal to or Less than 500' THEN IMDb Rating = Excellent.

Accuracy = 64.71% Coverage = 55.17%

7. IF A1 FB Likes Cat = 'Over 1G' AND A2 FB Likes Cat = 'Over 1G' AND Director Facebook Likes Cat not = 'Equal to or Less than 500' THEN IMDb Rating = Excellent.

   Accuracy = 100% Coverage = 44.83%

8. IF A1 FB Likes Cat = 'Over 1G' AND A2 FB Likes Cat = 'Under 1G but greater than 500' THEN IMDb Rating = Good.

   Accuracy = 100% Coverage = 82.08%

Figure 4 below shows the classification matrix of our decision tree for the test cases. From this chart we can see that our model correctly predicted 92.6% of the cases (1079/1165=.92618).

Figure 4: Classification matrix results

Predicted	Excellent (Actual)	Good (Actual)	Poor (Actual)	Average (Actual)
Excellent	132	45	0	0
Good	0	386	0	3
Poor	0	0	153	28
Average	0	10	0	408

CONCLUSION

It is our conclusion that we were able to show through our mining model, with 92.6% accuracy, that the social media component of the IMDb database is significant to the overall IMDb rating of a movie. Our model showed that Actor 1 FB likes were the most significant of all the FB "likes" categories. This could mean that if the IMDb rating is an important tool you use to pick a movie, then you might want to start by looking at social media for how the top actors are trending and what movies they are starring in. This also means for movie producers that above all factors when deciding to make a movie, the top actor can have more impact than a large budget or director.

Based on these results, movie makers could apply these models to the entire IMDb database to find a way to use social media as a predictor for investing in new movies. The use of Facebook "likes" has shown to be effective in predicting the IMDb rating of a movie and could then be translated to success of a movie at the box office. Social media has a tremendous impact on so many things in our lives today it would be prudent to consider that power when ranking movies, rather than just relying on reviewers who usually do the ranking for us.

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PREDICTING THE TOP THREE FINISHERS OF THE 2016 KENTUCKY DERBY USING LOGISTIC REGRESSION

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ABSTRACT

There are many methods of predicting or forecasting within the realm of multivariate statistical analysis. Different methods are suitable for different purposes. The aim of this study was to apply logistic regression analysis to effectively build a model that predicts whether a given horse might finish in the top three places of a race.

Logistic Regression modeling is one of several multivariate tools available to analyze complex data in order to find patterns and relationships that may not be apparent otherwise. The power of this method is the ability to predict outcomes or classifications of future events or observations. Logistic regression works with continuous and/or discrete predictor variables to find the probability of group membership for the response variable based on predictor variables.

In this project we were interested in whether or not a particular horse in the Kentucky Derby would finish in the top 3. In building our data set we limited our data to only the information that would be available pre-race to the average individual. By using logistic regression we were able to create a model that incorporated six different independent variables. The model correctly produced the highest probabilities for the top 3 finishers for the 2016 Kentucky Derby. In further testing we examined the difference in prediction accuracy between logistic regression and decision tree models for both the Kentucky Derby and the Preakness Stakes.

INTRODUCTION

Horse racing has a long and wide-spread history throughout the world. The Greco-Roman Olympics featured several forms of horse racing events including chariot and bareback races as far back as 700 BCE. Evidence suggests races were common in ancient China, Persia and the Middle East. In England, the first known prize money for a three-mile horse race among knights was £40. King Charles II is credited with initiating some of the first official rules of racing.

In the United States there are three major horse races that occur over a seven week period during the months of May and June. These races are the Kentucky Derby, the Preakness and the Belmont Stakes. Together they comprise to create the "Triple Crown" of American Thoroughbred Racing. Since 2001, over ten million viewers have watched the television broadcast of the Kentucky Derby each year. Over the last five years, the average number of television viewers has increased to approximately 15 million. According to USA today, the NBC telecast for the 2016 Kentucky Derby averaged 15.5 million viewers and garnered a 9.0 television rating. Not only has television viewership gone up during this time but so has the amount wagered on these races both at the track and through online gambling websites. According to an International Business Times article from May of 2015, the Kentucky Derby has consistently been the horse race with the highest handle since 2005.

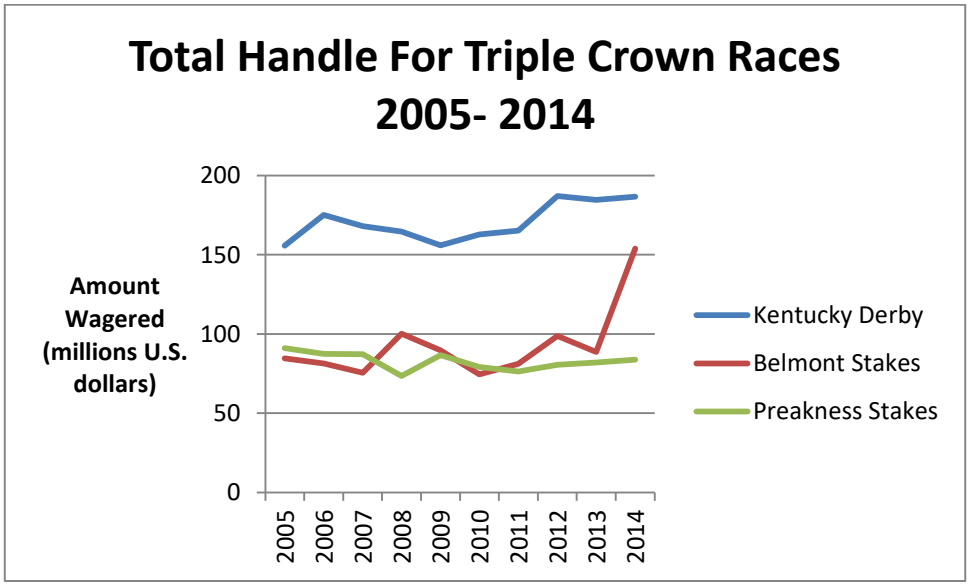

Figure 1: Amount Wagered on U.S. Triple Crown Races

In 2014, the amount wagered on the Kentucky Derby was a staggering 186.6 million U.S. dollars. This was slightly down from a record amount wagered in 2012 of 187 million dollars. The other two handles were consistently lower than the Kentucky Derby except for the 2014 Belmont Stakes handle of 153.9 million dollars, which can be linked with the near Triple Crown attempt of California Chrome. Ultimately, with this kind of money being thrown around on these races it can be surmised that the average American adult not only views these races but also wagers a bet on these races.

Wagers made on the outcome of a horse racing event(s) can range from very simple to extremely complicated. The simplest wager to make is for a particular horse to win. If there are x equal horses competing in a race then the probability of you winning this race would be 1/x. You could also make a wager on whether a horse would place, that is finish in first or second place. Additionally, you could wager on whether a given horse would show or not, meaning that they would place in the top 3. As you can imagine the payout on a "show" wager would be less than that for a "place" which would be less than the "win" wager. All of these bets are simple to make as well as understand for the average person. A more complicated bet, the "exacta," requires you to pick the first and second place horse in the exact order. A "trifecta" bet requires you to identify the first, second and third place finishers in the exact order. As you can imagine the odds of an individual getting these bets correct are less likely but the payout if correct is substantially higher. The higher payout is an incentive to draw in the average person.

With this in mind, we surmise that if subjects in a test or clinical trial can be predicted to fall into a certain group based on certain characteristics, events or other variables then why not try to predict whether or not horses in a race can fall into a group of winners?

Our intent is not to strike it rich or to foretell racing future but to draw upon the history of racing data and large array of variables that have been collected over the years in order to build a logistic model that might effectively predict outcomes of events with a high degree of reliability. The significance of a predictor variable and the magnitude of the influence of a variable can be determined with logistic regression.

In 1986, Bolton and Chapman published a paper in which they used both a multinomial logit model and a stochastic model to create optimal wagering strategies to produce positive returns on wagers placed on horse races. They used a data set of 200 races to create their models. Significant predictor variables included lifetime win percentage, average speed rating, winnings per race for the current year, jockey win percentage, jockey win totals, weight, post position and a distance that tries to capture the length of the past four races for each horse.

Further in 2011, Mata and Watts applied logistic regression in researching odds in horse racing in Great Britain, analyzing data from over 3,600 races and predicted favorites to place in approximately 65% of the races and the next favorites (2^{nd} Favorites) to place in 55% of races. Two interesting points from Mata include a slight tendency for favorites to win more in evening races and that horse-racing still contains a high-level of random chance making it difficult to predict and timelessly exciting.

VARIABLES and DATA

A data set was generated from a variety of sources including the official race website for the Kentucky Derby. The majority of the data used for building the model came from historical data collected by Bloodstock Research Information Services (www.brisnet.com) and Equibase Company, LLC. This company maintains an archived database of horse racing results. For this project, we utilized their "ultimate PPs" which are program sheets that contain past performance information on each horse in the race. These sheets provide an abundance of statistics on the competing horses, jockeys, trainers and owners. One can find out facts like who the sire (father) and dam (mother) were, career wins/places/shows and earnings, speed and conditions of all races previously run that year as well as myriad other facts that may or may not lead to an accurate prediction. Over thirty-five different variables were collected. Variable descriptions can be found in Table 3 in the Appendix.

The data set used to build the model contains information on the 321 different horses that competed in the Kentucky Derby over the time period from 1999 to 2015. Our data set was limited to 17 races due to the availability of pre-race information contained in the Bloodstock Research Information Services library. Any horse that was in the initial field of registered horses but was ultimately scratched from the race was excluded from our data set. The current year field (2016) for the Kentucky Derby was used as a test set against a model developed from the 1999 to 2015 data set.

This analysis focused on an array of information including but not limited to career earnings, numbers of wins/places/shows, winning percentage (career first places), speed last race, prime power numbers (calculated by a number of factors including race conditions) and the change from morning-line odds to pre-race odds (where the amount of betting influences the change in odds for each horse). Discrete variables included noting the presence or absence of medication, blinders or leg braces, whether or not a horse had won their previous race, was in the top 5 or top 10 in total earnings or average earnings. We also created variables that would enable us to quantify whether or not a particular jockey, owner and/or trainer performs better than others.

To better understand the data, an initial factor analysis was created in JMP to try to identify how many dimensions (underlying factors) are represented by the data for the initial nine quantitative variables collected. A factor analysis of the correlation matrix using a principal component solution explained 90.33% of the total variability in the nine variables by five factors. This testifies that there is not a lot of duplication in the information measured by the nine variables.

Variance Explained by Each Factor

Factor	Variance	Percent	Cum Percent
Factor 1	2.2636	25.152	25.152
Factor 2	2.2203	24.670	49.821
Factor 3	1.3850	15.389	65.210
Factor 4	1.1550	12.833	78.043
Factor 5	1.1062	12.291	90.335

Figure 2: JMP Output: Variance Explained by Each Factor

Rotated Factor Loading

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Speed Last Race	-0.029124	-0.044440	0.737723	-0.003294	0.058720
Prime Power	-0.043078	0.062215	0.725875	0.035461	-0.030612
Morning Odds	0.752738	-0.050300	-0.127145	0.039550	0.029495
Final Odds	0.788081	0.028403	-0.014832	0.022494	0.048273
Winning %	-0.052199	0.422458	0.107093	-0.400912	-0.347136
Total Wins	0.075857	0.802759	0.102188	-0.072504	-0.047160
Totals Place	0.022904	0.011089	0.028210	0.647179	-0.027209
Totals Show	0.027073	0.015472	0.025851	-0.022787	0.577175
Earnings	-0.324111	0.599486	-0.153311	0.074187	0.066336

Figure3: JMP Output: Rotated (Oblimin)Factor Loading Matrix

Further, each factor can be summarized as follows:

Factor 1 = Odds (Morning and final odds show a positive relationship)
Factor 2 = Winning Money (More wins = more money)
Factor 3 = Speed and Power Rating (Faster means higher rating)
Factor 4 = Placing (In a group by itself and negatively correlated with win percentage)
Factor 5 = Show and Win Percentage (Negatively correlated as placing, as show results go up, win percentage goes down)

LOGISTIC REGRESSION

Some challenges with logistic regression as a modeling and predictive tool include getting lost in a cycle of calculation iterations due to data that may not be completely "clean" or complete. Another challenge is complete separation when results can be predicted by one variable already.

We were looking to develop a model that would help us predict whether or not a particular horse would place in the top 3 finishers of the Kentucky Derby for a given year. A binary logistic regression model was chosen as it can model the relationship between a two category variable and one or more quantitative predictor or independent variables. The initial decision to apply logistic regression to this study was, in part, due to the characteristics associated with the type of analysis. Note that some of these predictor

variables can be dummy variables representing one or more categorical variables. Predictor variables do not necessarily need to be discrete or normally distributed and calculated probabilities are positive values. These models can be used to predict the probability of an event occurring for a set of values for the predictor variables. The probability can be found by using the formula:

$$\widehat{p} = \frac{e^{\text{Linear Function of values}}}{1 + e^{\text{Linear Function of values}}},$$

where the linear function of values = $b_0 + b_1 \cdot x_1 + b_2 \cdot x_2 + \ldots + b_k \cdot x_k$, where k = number of predictor variables.

A logistic regression was created using IBM SPSS software to estimate the probability of whether a given horse would place in the top 3. The dependent variable was the nominal variable "top 3". Both forward and backward step-wise methods were used to create binary logistical regression models. A significance level of 0.10 was set for entry and removal of independent variables into the model depending on the step-wise method being used. If the probability value for a given horse was computed to be greater than 0.5, then it would represent the model predicting that the given horse would place in the top 3. Similarly, if the probability value produced was less than 0.5 then the horse would not be predicted to place in the top 3. Ultimately, both models converged to contain the following six independent variables: speed last race, blinkers, front bandage, final odds, average earnings per race and top 10 earnings. The coefficients for these variables can be seen in the figure below.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 6[a]	SpeedLastRace	.090	.033	7.533	1	.006	1.095
	blinkers	-.941	.483	3.805	1	.051	.390
	frontbandage	1.072	.588	3.330	1	.068	2.922
	FinalOdds	-.040	.015	6.732	1	.009	.961
	AvgEarnPerRace	.000	.000	3.001	1	.083	1.000
	Top10Earn	-1.104	.465	5.646	1	.017	.332
	Constant	-9.782	3.377	8.392	1	.004	.000

a. Variable(s) entered on step 6: AvgEarnPerRace.

Figure 4: SPSS Output of significant independent variables in LR model.

The given model was able to classify 259 out of the 308 horses correctly from the 1999 to 2015 data set. This gives an overall percentage correct of 84.1% which can be seen in the classification table below.

Classification Table[a]

Observed			Predicted		
			Top 3		Percentage Correct
			0	1	
Step 6	Top 3	0	253	4	98.4
		1	45	6	11.8
	Overall Percentage				84.1

a. The cut value is .500

Figure 5: SPSS Classification Table for LR Model.

While at first glance it is great that the model was able to correctly identify 84.1% correct, what we are ultimately interested in, is those that place in the Top 3. Our logistic regression model only predicted ten horses to place in the top 3. Of those ten predictions it was able to correctly identify six horses. Most of the horses that were predicted to be in the top 3 were heavy favorites as well as having a larger amount of historical earnings when compared to others in the field for that particular year. The table below shows the ten predicted horses, the logistic regression model probability for placing in the top 3 and their final placing.

Table 1: LR Model Probabilities above 0.500

Horse (Year)	Logistic Regression Probability	Finish
Fusaichi Pegasus (2000)	0.718269	1
Millenium Wind (2001)	0.537984	11
Smarty Jones (2004)	0.62278	1
Bellamy Road (2005)	0.55714	7
Afleet Alex (2005)	0.660338	3
Street Sense (2007)	0.575475	1
Big Brown (2008)	0.821337	1
Alpha (2012)	0.549198	12
Carpe Diem (2015)	0.520098	10
American Pharoah (2015)	0.531404	1

When testing the model on the 2016 field of horses only one horse, Nyquist, was predicted to place in the top 3 horses (i.e. probability >0.5). The horses that took part in the 2016 Kentucky Derby, along with their logistic regression probability and finish can be seen in the table below.

Table 2: LR Model Probabilities for 2016 Kentucky Derby Field

Horse	Logistic Regression Probability	Finish
Nyquist	0.731013781	1
Exaggerator	0.350670044	2
Gun Runner	0.262341937	3
My Man Sam	0.139062134	11
Outwork	0.110736992	14

Brody's Cause	0.10711646	7
Mo Tom	0.106803987	8
Destin	0.104442706	6
SuddenBreakingNews	0.086531436	5
Danzing Candy	0.078535464	15
Mohaymen	0.073497431	4
Trojan Nation	0.072443013	16
Whitmore	0.067001496	19
Creator	0.057504006	13
Shagaf	0.041040094	DNF
Mor Spirit	0.038852756	10
Majesto	0.033211298	18
Oscar Nominated	0.021207108	17
Tom's Ready	0.020338657	12
Lani	7.91509E-05	9

While the model only predicted Nyquist as placing in the top 3, if you were to rank the logistic regression probabilities from largest to smallest, you can see that the model correctly identified the top 3 in the correct order. Thus, we hypothesize that instead of using the model strictly to predict whether or not a horse will place in the top 3, you could use the ordering of estimated probabilities to predict the placing of the top three finishers. For this particular race, using this model to make a $2 trifecta bet would have earned a payout of $173.40, certainly not a bad payout at the track! Note that if we had just randomly picked three random horses to win a trifecta bet, the probability that we would get this bet correct could be found by doing a permutation of ${}_{20}P_3$. This means that there are $\frac{20!}{(20-3)!} = 20 * 19 * 18 = 6{,}840$ different possible combinations that could be created for ordering the top 3. So by random selection you would have about a 0.02% chance of selecting the exact trifecta by random selection.

LOGISTIC REGRESSION VS DECISION TREE

In addition to the previous testing we decided to test the accuracy of a binomial logistic regression model to a decision tree model using SAS Enterprise Miner 13.2. For this additional testing we included the data from the 1999 to 2015 Kentucky Derby races and the 2000 to 2015 Preakness Stakes. In total, our data set contains information from 31 races and 420 horses.

In setting up the model in SAS Enterprise Miner we imported the data set but decided to exclude some variables from our data set. Before importing the data set we removed the variables Jockey, Jockey Number, Trainer, Trainer Number and Owner from the data set. After importing the data using the file import node we set the variables Horse, Year, Win, Place, Show to reject so that they would not be used when creating a model. After completing this step, we then decided to partition the data set by using a simple random sample technique which assigned 50% of the data to training, 30% to validating and the remaining 20% to testing. Next we created two modeling nodes, one for regression which was set to logistic regression and one that was set for decision tree. The regression model was specified to create the model using a backwards elimination method. For the decision tree the assessment measure was set to misclassification. The diagram procedure can be seen in the image below.

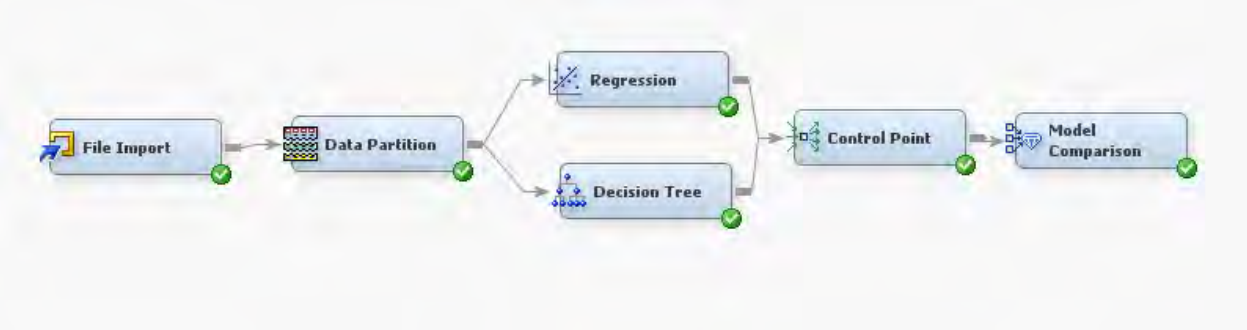

Figure 6: SAS Enterprise Miner Workflow Diagram

We decided to run the procedure through SAS EM ten times to see if there was a difference in the performance of the two models. For each trial, a different random seed number was generated by the author in order to obtain a different random sample in the training, validation and testing set. The overall criterion for selecting the best model was identifying the one that had the lowest misclassification rate on the testing set. Out of the ten trials, the logistic regression model had the lower misclassification rate six. Each model scored misclassification rates in the range of 0.18 to 0.26. The lowest misclassification rate was 0.181818 produced by the decision tree model on the third trial. This occurred when the decision tree model decided to predict that all observations (horses) in the test data set would not place in the Top 3. While this produces the lowest misclassification rate, it does not provide any value towards our goal of predicting the top 3 horses.

In each of the logistic regression models produced, the final models always produced models containing three variables. The only item of consistency here was that one of the odds variables, either morning odds or final odds was included in each of the models produced. Other variables that were found to be significant in models include Top 10 Earn, Total Wins, Speed Last Race, Trainer Win KD, Front Bandage, Earnings and Average Earn Per Race. The model that produced the lowest misclassification rate of 19.19% included the variables Final Odds, Speed Last Race and Front Bandage. The values for this model can be seen in the table below.

Table 3: Analysis of Maximum Likelihood Estimates (Logistic Regression EM)

Parameter	Top_3	DF	Estimate	Std. Error	Wald Chi-square	Pr>ChiSq	Estimate	Exp(Est)
Intercept	Yes	1	-8.7016	3.2126	7.34	0.0068		0.000
Final_Odds	Yes	1	-0.0376	0.0151	6.19	0.0128	-0.3706	0.963
Speed_Last_Race	Yes	1	0.0876	0.0310	7.98	0.0047	0.4067	1.092
front_bandage	Yes	1	-0.8487	0.2722	9.72	0.0018		0.428

The decision tree model that had the lowest classification rate where the decision tree did not predict all of the observations to have a Top 3 variable value of "No" had the following rules. The decision tree made its first split based on the value of the variable Speed_Last_Race. If Speed_Last_Race was less than 103.5 or missing, the model predicted "No" for Top 3 placement. Then next split in the tree was baed on the value for the variable Earn_Rank. If Speed_Last_Race was greater than or equal to 103.5 and EarnRank was less than 8 or missing then the decision tree made a prediction of "Yes" for placing in the top 3 finishers, likewise if Speed_Last_Race had a value greater than or equal to 103.5 and Earn_Rank

greater than or equal to 8 then the model predicted a value of "No" for the variable "Top_3". Output for the decision tree can be seen below.

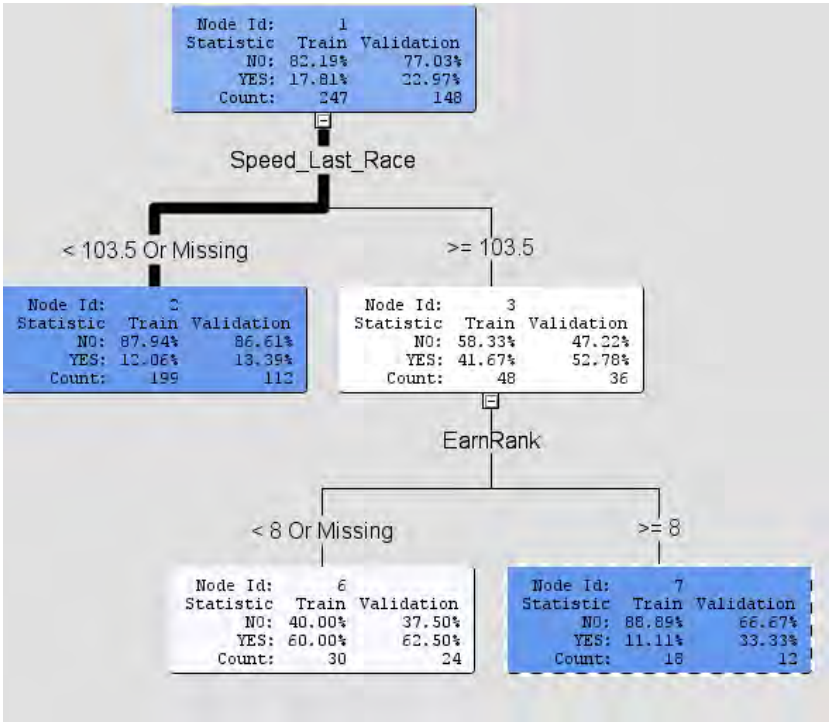

Figure 7: Decision Tree using SAS Enterprise Miner

The last item that we want to do with these two models is to check them against the 2016 results of the Kentucky Derby and the Preakness Stakes. The Logistic Regression Model provided the best prediction results for the 2016 Kentucky Derby and Preakness Stakes. The tables below show the computed probabilities for horses placing in the top 3.

Table 4: Logistic Regression Model Prediction Results Kentucky Derby and Preakness Stakes (2016)

Horse – 2016 Kentucky Derby	Probability of Top 3 Placement	Horse – 2016 Preakness Stakes	Probability of Top 3 Placement
Exaggerator	51.14%	Nyquist	59.45%
Nyquist	43.06%	Exaggerator	55.56%
Gun Runner	43.05%	Stradivari	48.32%
Trojan Nation	32.23%	Uncle Lino	38.84%
Brody's Cause	29.30%	Collected	32.50%
Destin	27.76%	Cherry Wine	23.05%
Creator	25.55%	Abiding Star	11.17%
Suddenbreakingnews	25.31%	Lani	8.54%
Mo Tom	23.93%	Awesome Speed	6.62%
Mor Spirit	22.81%	Fellowship	5.59%
Outwork	22.58%	Laoban	4.14%
My Man Sam	20.48%		
Danzing Candy	15.68%		

Whitmore	14.39%		
Oscar Nominated	12.23%		
Majesto	11.70%		
Mohaymen	6.31%		
Tom's Ready	6.23%		
Lani	0.00%		

In the 2016 Kentucky Derby, the top three finishers were Nyquist, Exaggerator and Gun Runner. The model only outright predicted a top 3 finish by Exaggerator but by a ranking of probabilities from least to greatest you see that the model was correctly able to identify the top 3 finishers just not in the exact order. The model did not do as well for the Preakness Stakes in which the top 3 finishers were Exaggerator, Cherry Wine and Nyquist. It did outright pick two of the three to finish in the top 3 but Cherry Wine was predicted to have a 23% probability of finishing in the Top 3 which was the sixth highest probability overall. Judging just on merit of identifying horses that will finish in the top 3 the logistic regression model identified 5 out of 6 which we feel are pretty decent results which could benefit the average person making a wager at the track.

If we use the rules from the decision tree to make predictions on the top 3 finishers we can see that the model did not fare as well as the logistic regression model. In the 2016 Kentucky Derby, no entrant had a previous race speed greater than 103.5, therefore all of the horses earned a top 3 finishing prediction of "No" by the model. In the 2016 Preakness Stakes, the decision tree made two "Yes" predictions for entrants Uncle Lino and Nyquist while all others earned a "No" prediction. Since Nyquist came in third, that earns the decision tree model an accuracy total of 1out of 6 for predicting the top 3 finishers in both races.

SUMMARY & CONCLUSION

We are aware that our data set is a very minute sample from the vast amount of historical horse racing pre-race data and results. We highly discourage the reader from wagering their entire life savings on the 2017 Kentucky Derby based on the logistic regression probabilities produced by this model. Ultimately, we are excited by the model's predictions for the 2016 Kentucky Derby and Preakness Stakes and look forward to using it to try to predict the top three finishers in both in years to come. Going forward we plan to create additional data sets using the past performance sheets for the 1999 – 2015 Belmont Stakes. Using the new data set we hope to construct an additional binary logistic regression model. Once this is created, we seek to compare and contrast the similarities and differences between all three models. Lastly, we would put all three data sets together and use random sampling to create and test a single logistic regression model that could be used for predicting top 3 finishers for a generic "Triple Crown" 2017.

On any given day your gut feeling may be as good as a computer-generated model. Whether you favor the colors of the jockey's jersey, a particular gate number or just the name of the horse, there are numerous ways to try and pick a winner. Perhaps one day statistical software packages running on computers will use automated reasoning and machine learning technologies to pick the winners but that would certainly take all the fun out of it for the general public. Until then let's hope there is always a chance for the 50-1 longshot!

APPENDIX
Table 5: Variable Descriptions

Variable	Description
Year	The year in which the horse participated in the Kentucky Derby
Horse	The name of the horse
Speed Last Race	The speed figure earned by each horse in their last start, regardless of distance or surface (www.brisnet.com)
Average Race Speed	Racing speed average is an average of the speed ratings earned by a horse over the course of its last three starts. (www.brisnet.com)
Prime Power	A number that measures the quality of each horse's most recent starts by combining dozens of handicapping factors into one easy-to-use rating. Speed, class, pace form, weight and many more factors are combined by a sophisticated algorithm to form this rating (www.brisnet.com)
Age	Age of the horse in years on the day of the race
Weight	The total weight carried by the horse in lbs. (jockey + additional weight)
Medicated	Was the horse medicated using - Lasix (1= yes, 0 = no)
Blinkers	Did the horse use blinkers (1 = yes, 0 = no)
Front Bandage	Did the jockey use a bandage to blind the horse during the race? (1 = yes, 0 = no)
Morning Odds	The amount you would earn if you wager $1 on that specific horse winning the Kentucky Derby. When wagering opens.
Final Odds	The amount you would earn if you wager $1 on that specific horse winning the Kentucky Derby. When wagering closes.
Move In Odds	= Final Odds - Morning Odds
Post Position	The number of the starting gate assigned to the horse. Random drawing
Winning %	% found by taking total wins / total races for each horse
# of days since last race	The number of days that have passed since the last race of a given horse.
Total Wins	Total number of first place finishes for a given horse.
Total Place	Total number of first or second place finishes for a given horse.
Total Show	Total number of top three place finishes for a given horse.
Jockey	The name of the jockey riding a given horse.
Jockey#	A number assigned to a specific jockey.
Jockey Num of Mounts KD	The number of races a given jockey has previously completed at KD.
Jockey Win % KD	The historical win percentage for jockey at Kentucky Derby. (as decimal)
Jockey Top 3 % KD	The historical percentage for jockey showing (top 3 placing) at Kentucky Derby. (as decimal)
Jockey Current Year Win %	The current year winning percentage for jockey. (as decimal).
Owner	The owner of the given horse.
Trainer	The trainer of the given horse.
Trainer #	A number assigned to a specific trainer.
Trainer Num. of Entries KD	The number of races a given trainer has previously entered a horse in at KD.

Trainer Win % KD	The historical win percentage for trainer at Kentucky Derby. (as decimal)
Trainer Top 3 % KD	The historical percentage for trainer's horse showing (top 3 placing) at Kentucky Derby. (as decimal)
Trainer Current Year Win %	The current year winning percentage for trainer. (as decimal).
Field Condition	Condition of the turf: sloppy, fast, etc.
Won Previous	Did the horse win their previous race? (1 = yes, 0 = no).
Num. of Races	The number of races the horse has competed in over their racing career to this point.
Earnings	Lifetime earnings for a given horse prior to the Kentucky derby.
Top 3	Did the horse place in the top 3? (1 = Yes, 0 = No)
Average Earn Per Race	= Earnings / Num. of races
Top 5 Earn	Was the horse in the top 5 for total earnings for a participant for the given year? (1 = Yes, 0 = No)
Top 5 Avg. Earn	Was the horse in the top 5 for average earnings per race for a participant for the given year? (1 = Yes, 0 = No)
Top 10 Earn	Was the horse in the top 10 for total earnings for a participant for the given year? (1 = Yes, 0 = No)
Top 10 Avg. Earn	Was the horse in the top 10 for average earnings per race for a participant for the given year? (1 = Yes, 0 = No)
Earn Rank	The relative earnings rankings compared to the other participants in the race.
Avg Earn Rank	The average earnings rankings compared to the other participants in the race.

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PRODUCTIVITY-DRIVEN APPROACH TO INTEGRATED BIOMASS-TO-BIOFUEL SUPPLY CHAIN DESIGN

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ABSTRACT

Contrary to the traditional cost-driven approach (CDA), we consider productivity-driven integrated biomass-to-biofuel supply chain (*IBtBSC*) design problem, where productivity is defined as the ratio of output to cost. The *IBtBSC* design problem should deal with two objectives, such as cost minimization and production maximization, would lead to improved productivity for biofuel through the supply chain. A goal programming (GP) approach is used by simultaneously taking several performance metrics into consideration in the formulation. A case study is conducted to evaluate and determine relative productivities of the performances of all alternatives generated by GP, and identify the best options among them by applying productivity-driven approach (PDA).

INTRODUCTION

Many researchers have maintained that bioenergy has been recognized as an important source of energy that will reduce nation's dependency on petroleum, and have a positive impact on the economy, environment, and society. Indeed, to reduce the dependence on unpredictable world oil supply and also to mitigate the environmental impacts (e.g., global climate change, pollution) of using fossil fuels, many countries around the world have been seeking the opportunity to use biomass feedstock such as corn, sugarcane, and switchgrass for producing biofuels, such as ethanol and biodiesel. Biofuels have been around as long as cars have. But cheap gasoline and diesel price for decades had made biofuels be forgotten. With the unstable gasoline price, along with growing environmental concern such as global warming caused by carbon dioxide emissions, biofuels has been regaining popularity. Many countries are now seeking the opportunity to use biomass feedstocks for producing biofuel. In fact, much of the gasoline in the United States is blended with ethanol. Also, under the Energy Independence and Security Act (EISA) of 2007, the U.S. Environmental Protection Agency (EPA) has developed a Renewable Fuel Standard program (RFS) to ensure that gasoline in the U.S. contains a minimum percentage of renewable fuel. The latest RFS [16] "w*ill increase the volume of renewable fuel required to be blended into gasoline from 9 billion gallons in 2008 to 36 billion gallons by 2022*."

Many existing studies have focused on bioprocessing technologies to improve the biofuel yield and quality (Antonpoulou et al. [1]; Lee et al. [9] ; Ranganathan et al. [12]; van Dyken et al.[17]; Weyens et al. [18]). Although the cost of transporting bulky and unrefined biomass feedstock is also significant as compared to the total cost of producing biofuel, much less attention has been given to the understanding of biomass and bio-energy logistics systems and the reduction of

biomass and bio-energy logistics costs. In recent years, several biomass-to-bioenergy logistics studies have been conducted. Most of these existing studies focus either on the optimization of biorefinery locations (Celli et al. [2]; Graham et al. [6]; Panichelli & Gnansounou [10]; Perpina et al. [11]; Steen et al. [15]) or on the optimization and simulation of the biomass collection, storage, and transport operations (Frombo et al. [5]; Kumar & Sokhansanj [8]; Rentizelas et al. [13]; Sokhansanj et al. [14]). Eksioglu et al. [3] investigate the integrated biomass and biofuel logistics network design, simultaneously taking into account the optimization of facility locations (e.g., collection facilities, bio-refineries), transportation, and inventory control. In their paper, several critical issues are not adequately addressed: for instance, how the uncertainty in biomass yield affects the robustness and optimality of the logistics network design and how to develop efficient heuristic algorithms to solve the formulated logistics model, which typically is an NP-hard problem. Hong et al. [7] consider the effect of the uncertainty in biomass yield and propose a simulation-based robust biofuel facility location model for solving a bio-energy logistics network problem with the objective of minimizing the total logistics cost (TLC).

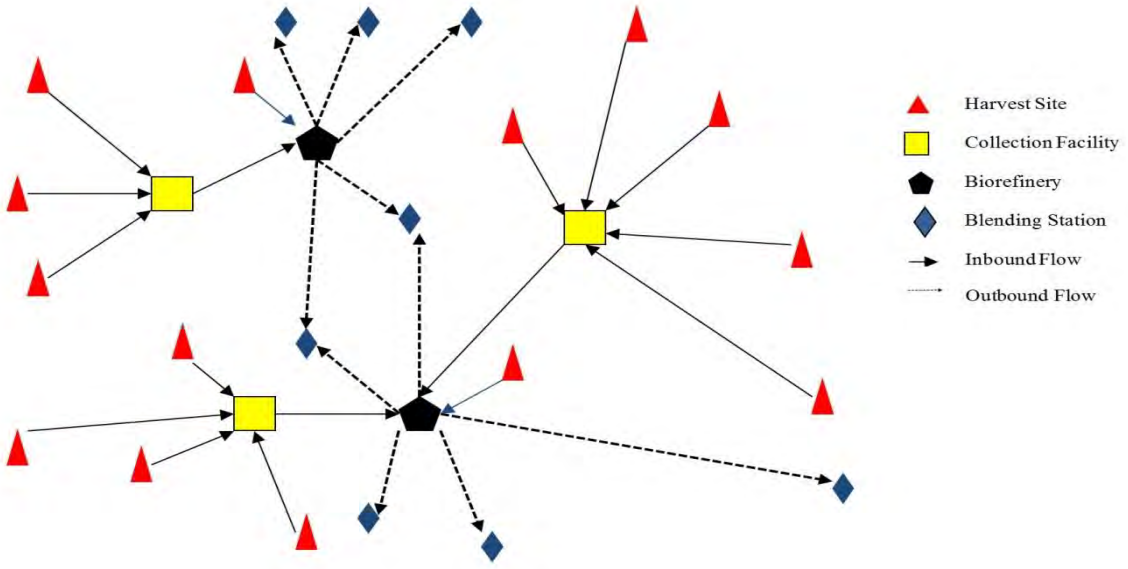
Contrary to the traditional total cost-driven approach (CDA), we consider the productivity, which is defined as the ratio of production amount of biofuel to the total logistics costs. Thus, we consider two goals as the major performance measures. The first goal is to minimize the total logistics cost (TLC). The second goal is to maximize the amount of biofuel produced by BRFs. To accommodate these two goals in one objective function, we use goal programming (GP) approach as a tool for designing a productive *IBtBSC*. The typical GP model allows the decision maker to assign weights to the deviational variables in the objective function to better reflect the importance and desirability of deviations from the various goals. The aim of this paper is to apply productivity-driven approach (PDA) to evaluate each optimal solution for given weights, generated by GP model formulated for the *IBtBSC* design problem, and to identify most efficient option from all options, where a commonly used measure of efficiency is the ratio of output to input. As far as we know of, applying PDA to *IBtBSC* design problem has not been tried in the literature. This innovative process would help practitioners as well as researchers to produce finer evaluation of productivity and to provide a design and benchmarking framework for designing *IBtBSC* system to improve overall supply chain productivity.

GOAL PROGRAMMING MODEL

Let F be the set of all harvesting sites (HSs) and potential collection facility (CF) locations, indexed by f. Now, let J, I, and K respectively be the set of CFs, BRFs, and BSs, indexed by j, i, and k. Also, let L and G respectively be the set of capacities of BRF and CF, indexed by l and g. The parameters used in this formulation are the following: ψ_{il}^{b} is amortized annual cost of constructing and operating a BRF_i with the l^{th} size; ψ_{jg}^{c} is amortized annual cost of constructing and operating a CF_j with the g^{th} size; C_l^b and C_g^c denote the actual capacity of l^{th} and g^{th} size of BRF and CF, respectively; β_f and γ_f are conversion rates to bio-energy of biomass feedstock shipped from CF to BRF and from HS to BRF, respectively; S_f denotes the yield of biomass feedstock from HS_f; D_k is the demand of biofuel for BS_k; δ_i is the maximum number of HSs that ship biomass directly to BRF_i; d_{fj}^1, d_{fi}^2, d_{ji}^3, and d_{ik}^4 are unit transportation cost (UTC) from HS_f to CF_j, from HS_f to BRF_i, from CF_j to BRF_i, and from BRF_i to BS_k, respectively. In this study, we

set $d^2_{fi} \geq d^1_{fj}$, to denote a higher unit transportation cost for shipping biomass from HS_f directly to BRF_i.

Figure 1. Schematic of Biomass-Biofuel Supply Chain



The decision variables used in the mixed integer quadratic programming (MIQP) formulation are the following: x^b_{il} is a binary variable that equals 1 if a biorefinery of size l is located in site i, and 0 otherwise; x^c_{jg} is a binary variable that equals 1 if a collection facility of size g is located in site j, and 0 otherwise; y^1_{fj} is a binary variable that equals 1 if HS_f's yielded biomass shipped to CF_j and 0 otherwise; y^2_{fi} is a binary variable that equals 1 if HS_f ships biomass directly to BRF_i, and 0 otherwise; y^3_{ji} is a binary variable that equals to 1 if CF_j is assigned to BRF_i, and 0 otherwise; y^4_{ik} is the fraction of BRF_i' produced biofuel shipped to BS_k.

Letting N_b and N_c denote the maximum number of BRFs and CFs to be built, we formulate the following MIQP model that minimizes the total logistics cost (TLC), which is the sum of the annualized construction and operation cost for CFs and BRFs and the transportation costs from HSs to CFs, HSs to BRFs, CFs to BRFs, and BRFs to BSs:

$$TLC = \left[\sum_{i\in I}\sum_{l\in L}\psi^b_{il}x^b_{il} + \sum_{j\in J}\sum_{g\in G}\psi^c_{jg}x^c_{jg}\right] + \left[\sum_{j\in J}\sum_{f\in F}S_f d^1_{fj}y^1_{fj} + \sum_{i\in I}\sum_{f\in F}S_f d^2_{fi}y^2_{fi}\right]$$
$$+ \left[\sum_{i\in I}\sum_{j\in J}\left(\sum_{f\in F}S_f y^1_{fj}\right)d^3_{ji}y^3_{ji}\right] + \left[\sum_{i\in I}\sum_{k\in K}D_k d^4_{ik}y^4_{ik}\right] \quad (1)$$

To find the amount of biofuel production (*ABP*), let β_f denote the conversion rate to biofuel of biomass feedstock shipped from CF to BRF and γ_f the conversion rate to biofuel for biomass feedstock shipped from HS to BRF. Now, *ABP* is given by

$$ABP = \sum_{i\in I}\sum_{j\in J}\left[\sum_{f\in F} S_f\, y_{fj}^{1}\, y_{ji}^{3}\right]\beta_f + \left[\sum_{i\in I}\sum_{f\in F} S_f\, y_{fi}^{2}\right]\gamma_f. \tag{2}$$

Let the nonnegative deviation variables, δ_{TLC}^{+} and δ_{ABP}^{-}, denote the amounts by which each value of *TLC* and *ABP* deviates from the minimum value of *TLC*, TLC_{min}, and maximum values of *ABP*, ABP_{max}, respectively. Then, the deviation variables are given by

$$\delta_{TLC}^{+} = TLC\ in\ (1) - TLC_{min}, \tag{3}$$

$$\delta_{APB}^{-} = ABP_{max} - ABP\ in\ (3). \tag{4}$$

Now, the weighted sum of the percentage deviations is defined as

$$G(\alpha) = \alpha_1 \frac{\delta_{TLC}^{+}}{TLC_{min}} + \alpha_2 \frac{\delta_{APB}^{-}}{APB_{max}}, \tag{5}$$

where α_g, g= 1 and 2, is a weight factor ranging from 0 and 1 and $\sum_g \alpha_g = 1$. Setting up Equation (5) as an objective function, we formulate as a mixed integer quadratic programming (MIQP) model as follows:

Minimize $G(\alpha)$ in (5)

subject to

$$X_i^b = \sum_{l\in L} x_{il}^b,\ \forall i \in I \tag{6}$$

$$X_j^c = \sum_{g\in G} x_{jg}^c,\ \ \forall j \in J \tag{7}$$

$$\sum_{i\in I} X_i^b \le N_b, \tag{8}$$

$$\sum_{j\in J} X_j^c \le N_c, \tag{9}$$

$$\sum_{j\in M} y_{fj}^{1} + \sum_{i\in I} y_{fi}^{2} = 1, \forall f \in F \tag{10}$$

$$X_j^c u_j \leq \sum_{f \in F} y_{fj}^1 \leq X_j^c U_j, \quad \forall j \in J \tag{11}$$

$$\sum_{f \in F} S_f y_{fj}^1 \leq \sum_{g \in G} C_g^c x_{jg}^c, \quad \forall j \in J \tag{12}$$

$$\sum_{j \in J} \sum_{f \in F} \beta_f S_f y_{fj}^1 y_{ji}^3 + \sum_{f \in F} \gamma_f S_f y_{fi}^2 \leq \sum_{l \in L} C_l^b x_{il}^b, \quad i \in I \tag{13}$$

$$\sum_{i \in I} y_{ji}^3 = X_j^c, \quad \forall j \in M \tag{14}$$

$$\sum_{f \in F} y_{fi}^2 \leq \sum_{l \in L} \delta_i x_{il}^b, \quad \forall i \in I, \tag{15}$$

$$\sum_{i \in I} \left(\sum_{j \in J} \sum_{f \in F} \beta_f S_f y_{fj}^1 y_{ji}^3 + \sum_{f \in F} \gamma_f S_f y_{fi}^2 \right) \geq \sum_{k \in K} D_k \left(y_{ik}^4 \right), \tag{16}$$

$$\sum_{i \in I} y_{ik}^4 = 1, \quad \forall k \in K. \tag{17}$$

Let P_ω denote the productivity score for ω^{th} option generated by solving MOP model, where $\omega = 1, 2, \ldots, \Omega$. Then

$$P_\omega = \frac{ABP_\omega}{TLC_\omega}. \tag{18}$$

For the maximum productivity score to be equal to one, we use a normalized productivity parameter as follows:

$$P_\omega^n = {P_\omega}\Big/{max_{\kappa \in \{1,..,\Omega\}} P_\kappa}. \tag{19}$$

CASE STUDY

We modify and conduct a case study that Hong et al. [7] use and follow the scenario illustrated in Figure 3. Five (5) locations {Branchville, Cayce, Lake City, Prosperity, Ridgeland} and ten locations (10) throughout SC are selected as candidate sites for BRFs and blending stations (BSs), respectively, as shown in Figure 3. The potential locations for BRFs are selected based upon low population density, easy access to interstate highways, etc. Although not shown in Figure 3, the actual distances between cities representing HSs, CFs, BRFs, and BFs, are found. Table 1.a shows the demands (in thousand gallons) for all BSs. These demands are hypothetical values and would be readily replaced by true demand data for real-world applications. We summarize the values of the input parameters in Table 1.b. As shown in Figure 3, the minimum, maximum, and average amounts of biomass yield at each HS are summarized in Table 1.c.

Table 1.a. Demand for Blending Station

No.	Blending Station	Demand(in 1000 gallons)
1	Aiken	200
2	Bishopville	200
3	Clinton	300
4	Dillon	200
5	Greenville	200
6	Lancaster	200
7	Manning	250
8	Santee	150
9	Spartanburg	200
10	Summerville	150

Table 1.b. Input Data Used for Case Study

Symbol	Meaning	Value
ψ_{il}^{b}	Amortized annual cost of constructing and operating a BRF_i with the l^{th} size	\$0.7M, \$0.8M, and \$1M for l=1, 2, 3.
ψ_{jg}^{c}	Amortized annual cost of constructing and operating a *CFj* with the gth size	\$120K, \$150K, and \$200K for g=1, 2, 3.
C_l^b	Actual capacity of l^{th} size of BRF	500K, 800K, 1M gallons for l=1, 2, 3.
C_g^c	Actual capacity of g^{th} size of CF	400K, 800K, 1M tons for g=1,2,3.
β_f	Conversion rates to bio-energy of biomass feedstock shipped from CF to BRF	70%
γ_f	Conversion rates to bio-energy of biomass feedstock shipped from HS to BRF	40%
δ_i	Maximum number of HSs that ship biomass directly to BRF_i	16
N_b	Maximum number of BRFs to be built	2
N_c	Maximum number of CFs to be built	4
d_{fj}^{1}	Unit transportation cost (UTC) from HS_f to CF_j	\$0.005/mile/K metric tons
d_{fi}^{2}	Unit transportation cost (UTC) from HS_f to *BRF*	\$0.01/mile/K metric tons
d_{ji}^{3}	Unit transportation cost (UTC) from CF_j to BRF_i	\$0.007/mile/K metric tons
d_{ik}^{4}	Unit transportation cost (UTC) from BRF_i to BS_k	\$0.01/mile/K gallons

Before solving the GP model, it is necessary to determine the target values for each goal parameter. These values can be found by solving the MILP problem with the constraints (3)-(4)

and (6)-(17) with the objective function of the corresponding equations of *TLC* in (1) and *ABP* in (2). In fact, each of these target values could be obtained by setting the corresponding weight equal to 1 and solving the MILP problem. For example, setting $\boldsymbol{\alpha}$ = (1, 0) and solving the MILP model yields the target value of *TLC*, TLC_{min} Now, we solve and summarize the target values of two performance metrics, TLC_{min} and ABP_{max}, in Table 2. Using the values in Table 2, the GP model is solved for various values of the weight, α_g, where each weight changes between 0 and 1 with an increment of 0.1. There are eleven configurations. After we solve the model, we reduce eleven configurations into five consolidated configurations, based upon the values of the two performance measures.

Table 1.c Biomass Yield

No	Harvest Site	Minimum Yield (Thousand Metric Tons)	Average (Thousand Metric Tons)	Maximum Yield (Thousand Metric Tons)
1	Allendale	100	150	200
2	Berkeley	150	200	250
3	Chester	150	225	300
4	Colleton	100	200	300
5	Darlington	150	225	300
6	Dorchester	150	225	300
7	Florence	150	225	300
8	Georgetown	250	400	550
9	Greenwood	150	225	300
10	Hampton	150	225	300
11	Horry	100	175	250
12	Lexington	100	175	250
13	Newberry	250	400	550
14	Orangeburg	150	225	300
15	Richland	250	400	550
16	York	150	225	300

Table 2. The Target Values of Two Goals.

Target Value	$\boldsymbol{\alpha}$=(α_1, α_2)	*TLC*(K$) (pd)	*ABP* (Kgallon) (pd)
TLC_{min}	(1, 0)	**4,022.17** (0.0)	2317.5 (15.11)
ABP_{max}	(0, 1)	7,501.63 (86.5)	**2730** (0.0)

pd: percentage deviation from the target value

In Table 3, for each configuration of weights, we present values of the two performance metrics along with normalized productivity score, P_ω^n, and rankings of P_ω^n. As shown in Table 3, if we

focus on minimizing the total logistics cost only, as the schemes #10 or #11, it may not yield the most productive supply chain design scheme. In a similar vein, the scheme with the maximum ABP, as shown in the scheme #1, would not be the most productive one. In fact, the schemes #1 and #10 (#11) turn out to be the two worst productive scheme, which ranks the very last two. Note that the schemes #2, 3, 4, and 5 yield the same TLC and ABP and rank 1st, whereas the schmes #6 and 7 yielding the same TLC and ABP ranks 2nd.

In Table 4, we present the optimal locations and allocations of CFs and BRFs and assignments of BRFs to BSs for the most productive supply chain scheme. The schemes #2 through #5 generate the maximum ABP, none of HSs ships directly to BRFs. Their transportation routes do not look as efficient as the schemes #10 and #11, such as the long shipping distances from HS {Colleton} to CF{Newberry} and from HSs {York} and {Hampton} to CF {Florence}.

SUMMARY AND CONCLUSIONS

In this paper, we consider an integrated biomass-to-biofuel supply chain (*IBtBSC*) design problem, using productivity-driven approach (PDA). The productivity is defined as the ratio of the amount of biofuel production (ABP) to the total logistics cost (TLC). To design more balanced *IBtBSC*, we use a goal programming (GP) modeling method. The GP would provide various supply chain schemes to the decision maker. Through a case study, we evaluate those schemes using PDA and rank them in terms of the generated productivity score of each alternative. As expected, the scheme with either the highest ABP or the lowest TLC is not the most productive one, as shown in Table 3. In other words, the scheme with the highest ABP requires the highest TLC, whereas the scheme with the lowest TLC results in the lowest ABP. Contrary to the conventional cost-driven approach (CDA) used by many researchers, the supply chain scheme with the minimum TLC is not necessarily the best or the most productive one from an integration perspective. This paper demonstrates that our framework would generate a balanced biomass-to-biofuel supply chain scheme, and shows that the applicability of our innovative approach to this type of supply chain design problem.

Table 3. Numerical Example

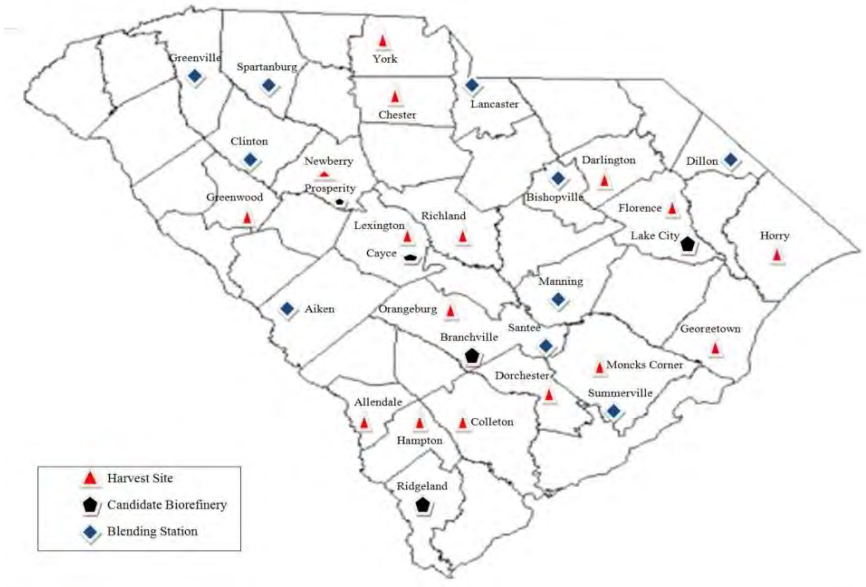
No.	$\boldsymbol{\alpha} = (\alpha_1, \alpha_2)$	TLC	ABP	P_{ω}^{n}	Rank
1	(0.0, 1.0)	$7,501.63	2730.0	0.5874	11
2	(0.1, 0.9)	$4,406.66	2730.0	1.0000	1
3	(0.2, 0.8)	$4,406.66	2730.0	1.0000	1
4	(0.3, 0.7)	$4,406.66	2730.0	1.0000	1
5	(0.4, 0.6)	$4,406.66	2730.0	1.0000	1
6	(0.5, 0.5)	$4,108.06	2542.5	0.9990	5
7	(0.6, 0.4)	$4,108.06	2542.5	0.9990	5
8	(0.7, 0.3)	$4,103.25	2535.0	0.9972	7

9	(0.8, 0.2)	$4,046.20	2422.5	0.9664	8
10	(0.9, 0.1)	$4,022.17	2317.5	0.9300	9
11	(1.0, 0.0)	$4,022.17	2317.5	0.9300	10

Table 4. Location and Allocation of Biofuel Facilities for Most Productive Supply Chain Scheme

No	Harvest Site	Collection Facility	Bio-Refinery	Blending Station
2, 3, 4 & 5	Colleton Greenwood Lexington Newberry	Newberry	Prosperity	Aiken Clinton Greenville Lancaster Spartanburg
	Allendale Chester Orangeburg Richland	Richland		
	Darlington Florence Hampton York	Florence	Lake City	Bishopville Dillon Manning Santee Summerville
	Berkeley Dorchester Horry Georgetown	Georgetown		

Figure 3. Candidate Sites for Bio-Refineries, Harvesting Sites, and Blending Stations



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Providing Students with Proper Knowledge and Skills for Analytics and Big Data

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Abstract: These experienced faculty share their classroom experience that will include foundational tools and capabilities such as Microsoft PowerPivot, SQL, Tableau, R and communicating statistical results with graphs. They will additionally cover important foundational concepts that are easy to overlook when analyzing large data sets. There are subtleties that we often move past too quickly but need to be considering in the world of big data. Those tiny p-values might not indicate as much statistical significance as their size suggests!

Providing What Students Need; Not What Is Easiest for Faculty: In-Depth Strategic Assessment of the Strategy Course

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PROVIDING WHAT STUDENTS NEED; NOT WHAT IS EASIEST FOR FACULTY: IN-DEPTH STRATEGIC ASSESSMENT OF THE STRATEGY COURSE

It is always interesting to learn what others think of strategic management, what it is, and how it should be taught. From Business Deans who argue (even within the last 6 years) that *anyone* can teach strategy (Business, 2010) to the Wall Street Journal that lists headlines on its link designated as "strategic management" articles ranging from stories such as "Musicians and Promoters: Scalpers May Not Be the Enemy After All" to "The Real-World Test Your Startup Needs to Raise Money" (Wall Street Journal, 2016) it is evident that confusion still exists. Given such a diverse variety of topics that are regularly classified as "strategy", the concept seems to defy a unified singular definition and associated application. The confusion and misunderstanding has been prevalent for quite some time. For example, Grant (2008) suggested two schools of thought: one was associated with term "Business Policy" which was typically non-theoretical and was typically taught by executives via their "war stories" and personal experiences. Nonetheless, these executive-led courses were also considered to be a capstone experiences which required the integration of all functional- and discipline-based courses. The second approach identified by Grant, "Strategic Management", was theory-based and was often taught as a foundation course with much of the theory based in economics and the "Theory of Profits". The editors of this special issue of JMI in which Grant's article appeared have recognized not only these two different streams as (1) the *practice- based approach* and (2) the *theory acquisitive approach* but have, in addition, included a number of other topics worthy of investigation.

For those who research and teach strategy/strategic management -- whether at a research one institution or at a primarily teaching institution -- gaining the respect of peers for this subject area as a legitimate separate and relevant topic has indeed consumed nearly half a century. Many have wondered if the primary emphasis on tools sets (Kaner, 2005) and dispassionate theories (Ghoshal, 2005) might explain major ethical failures such as Enron while others have maintained that ethics is embedded in the

psyche of students many years before they become strategic management students (Gapper, 2005). At the same time, the question still persists as to whether strategic management is really necessary in business education anymore (Bower, 2008)! *Really?!?*

However, it is our position that the above-mentioned issues are not the real problems, but rather they are merely symptoms of panicked responses. Our observation is that our business students are leaving our undergraduate and graduate programs and are subsequently not doing well in the highly complex, ambiguous, and rapidly-changing dynamics of the information technology-driven frenzy that are hallmarks of current business environments. Additionally, today's students are not choosing to enter graduate programs that offer strategic management orientations or strategic management concentrations. Apparently, these students do not understand these concerns, and further, their employers can readily discern that these students do not understand. Nonetheless, these employers continue to expect their new employees to be capable of thinking and acting strategically even more so now than in the past. Furthermore, these employers do not want these new hires entering the workplace at a novice level, but as individuals who have had sufficient experience to be able to identify what to do and to then take action and get it done!

It is our position that it is not so much that classic strategic content and tools are not relevant as it is that our programs of education have not adjusted to the changes in our incoming students, their knowledge and thinking levels. Today's college-level students known as Millennials now range in age from 30 to 18. Hence, they currently populate undergraduate, graduate and some executive education programs. Furthermore, especially at the undergraduate level, the typically identified characteristics of Millennials have disrupted these students' ability to learn in the ways that drive our traditional teaching methods which were predicated upon very different assumptions of foundational knowledge and thinking ability. We, in our roles as distributers of knowledge, have failed to recognize and appreciate the different needs of our incoming students as well as we should. Regrettably, many current

instructors insist on trying to make today's students conform to learning styles and methods that were relevant when these instructors were students. They fail to acknowledge that today's students have had very different learning experiences and have grown up in very different contexts.

So, while agree that pedagogical change is needed and that faculty need to update their appreciation of change and their curricula regularly, we do not support the notion of the claim of the artificial dichotomy between theory and practice being at the root of the discussions presented above. Instead, we maintain that our methods of teaching need to be customized to match the learning needs of our current students – regardless of whether those students are executives or traditional-aged college students completing their first degree. In this paper, we propose to illustrate how a live case project can be customized to today's audience of Millennials while still enabling the integration of theory and practice and to thus give students the full spectrum (theories, practices, tools, and justifications) while training them to progress from the overly-structured and passively-oriented educational foundations that they have previously experienced to the more dynamic, messy and ambiguous world of real-world business today. We begin by profiling and seeking to understand the current student.

MILLENNIAL STUDENTS

Millennial students have been described as being born between 1980 and 2001 in popular business press (Alsop, 2008) and at times have also been known at Generation Y which has had a birth date range from 1977 to 1992 (Yahr & Schimmel, 2013). From the beginning of the new millennium, students in higher education have been entering academia with lower skill sets (Nonis, Hudson, Philhours, & Teng, 2005). With past generations, there was merely a generational effect associated with viewing the newcomers as deficient via test results, writing, samples, and actual submitted work, the Millennials tend to all show a decline in quality (Leinberger, 2015; Twenge & Campbell, 2012). It

appears that, outside a very small boundary of learning environments, Millennials tend to be passive in the classroom and dislike hard work (Litzenberg, 2010; Twenge & Campbell, 2012). Furthermore, when faced with complicated or abstract information, students fail to use appropriate learning strategies such as asking questions (Aydeniz & Gilcrist, 2013). With Millennials, ambiguity is perceived as being unfair and when present, it is perceived as evidence of a bias against them personally (Twenge, 2010).

Millennial-aged students do show higher narcissistic tendencies than the population in general (Balaji & Indradevi, 2015; Twenge J. , 2010; Twenge & Campbell, 2012). This tendency is usually expressed via the need for positive feedback (Foster, 2015). In the classroom, this narcissism is usually accommodated by instructors who demonstrate caring for the students with passion about their topic and enthusiasm for the class (Therrell & Bunneback, 2015). Clearly expressed expectations and positive correlation between material taught and test content were also highly desired (Therrell & Bunneback, 2015). Finally, in contrast to Barnes and Jacobsen, there was an expressed desire for more real-world examples and active learning opportunities in order to engage these students' attention and increase their focus on the material whether in class or engaged in homework (Therrell & Bunneback, 2015). Today's current millennials (those born around the turn of the century) can be seen as curious and desiring to be engaged (Bitterman & Hess, 2015) but in a customized way (personalized to their own tastes) (Balaji & Indradevi, 2015; Rogers, 2015) and in a nervous (Bitterman & Hess, 2015) fashion given their exposure to the economic crises of 2008-2009 (Twenge & Campbell, 2012; Bitterman & Hess, 2015). These students are part of the Millennial generation that is transitioning to the iGeneration (Rogers, 2015) or the Z Generation (Schakett, Schertzer, & Kleine, 2015). High technology information interface devices are the standard with them (Twenge & Campbell, 2012); however, they are less skilled in functional applications like word processing or spreadsheet use (Leinberger, 2015). They are often considered to be rude due to their use of high tech devices which often precludes the use of face-to-face standard communication efforts. Their schools tend to employ teams and technology in the classroom,

and so they can be confused when faculty refuse to allow them to keep their cell phones active in class. They want to act, to use their information immediately (Bitterman & Hess, 2015) rather than just receiving information or reading about it or planning for the action (Bitterman & Hess, 2015) (Therrell & Bunneback, 2015). Yet, Millennials are also the least open to new experiences and creativity of all generations since those of the World Wars (Twenge & Campbell, 2012).

In their upbringing and nurture, these students have generally been protected from risk and uncertainty (Schakett, Schertzer, & Kleine, 2015; Harris, 2010; Weiler, 2004). Consequently, they need to develop skills in coping with uncertainty and ambiguity (Schakett, Schertzer, & Kleine, 2015; Tallent & Barnes, 2015) so that they can differentiate themselves and proceed to controlling their own personal growth and development (Schakett, Schertzer, & Kleine, 2015). Because of this protection, these students typically have few skills in developing their own mental maps of topics and contexts (Mumford, Campion, & Morgeson, 2007). They have been a part of the "No Child Left Behind" culture of testing and retesting and thus simply cannot believe that a deadline or a test result is absolute (Leinberger, 2015). They have been able to earn trophies for just showing up; consequently, earning an award on their own merit and by hard work is a foreign concept (Schakett, Schertzer, & Kleine, 2015; Twenge & Campbell, 2012).

They are strongly influenced in what they remember by how much they like a professor (Gross, Lakey, Edinger, Orehek, & Heffron, 2009). Affect significantly influences today's students.

It should not be surprising that they have a stronger need for help in improving their critical thinking and decision making skills than preceding generations (Schakett, Schertzer, & Kleine, 2015). Recall that these students abhor ambiguity, the very thing that large and small employers say that they need incoming employees to be able to handle. Yet, we maintain that with the proper adjustments to

our teaching practices, these student can learn and exceed the skill sets of earlier generations (Leinberger, 2015; Domke-Damonte, Keels, & Black, 2013).

COLLEGE PEDAGOGICAL PRACTICES THAT WORK FOR MILLENNIALS

Traditional pedagogical means have negative results with many Millennial students including lower grades, lower retention of information performed in national field exams and fewer students choosing to major in courses that they perceive to be difficult or with higher failing rates (Leinberger, 2015; Therrell & Bunneback, 2015; Fletcher, 2006). Much earlier forms of pedagogy relied on students' ability to integrate from a foundation of reading, listening, speaking and writing (composition and penmanship) to sharpen their ability to think clearly and reflectively (Tallent & Barnes, 2015; Leinberger, 2015). Furthermore, students are arriving in our classrooms with little to no skill in writing in cursive style which means that their note-taking skills are negligible, their ability to read cursive feedback provided by faculty is diminished, and when taking in-class essay exams, their speed in answering is slowed down substantially (Leinberger, 2015). Students themselves can see this lack and as recently as 2006, nearly 40% of them acknowledged feeling not prepared for either work or school (Fletcher, 2006).

Student learning preferences like many attributes of this Millennial generation reflect their views having been shaped by popular media (Barnes & Jacobsen, 2015). When considering lectures, video media, or group work, they believe that a lecture is the most educational means for a class and dislike group work the most (Barnes & Jacobsen, 2015). When combined into scenarios of either video or lecture combined with activities, videos, discussion or group project, they find the video and class discussion the most enjoying and educational combination with a lecture and video next (Barnes & Jacobsen, 2015). Some have noted that the integrated use of technology appears to engage students

(Fletcher, 2006) while others note that they lack the technological skills to make them successful in today's colleges and knowledge economy world (Leinberger, 2015).

Many Millennials come to college with at least some exposure to Montessori-like classroom conditions (Bitterman & Hess, 2015) where students have control of what they do and when they do it within the bounds of the classroom opportunities and academic deadlines. Others arrive having been taught to be passive in the classroom (Litzenberg, 2010) and to obtain clear instructions for everything that they do… otherwise, it is ambiguous and thus biased (Twenge J. , 2010). However, both types of Millennial students respond to classes that involved active learning and an immediate application of knowledge with explicit rational for policies, assignments, and tests (Price, 2011). Millennials will usually respond positively to the use of technology in a course (O'Connor, Kieser, & Olivo, 2011) but will need training in advanced use of word processing and spreadsheets (Leinberger, 2015). These Millennials also respond well to personalized support and consultations with the professor (Bergmann & Sams, 2012).

Because of the testing orientation of No Child Left Behind and the preparations that they have learned for that type of test, the ability to test and retest is valued in a classroom by Millennials (Leinberger, 2015). Combined, the acceptance of technology and video use along with the use of testing and retesting indicated that Millennials also are open to being in a flipped classroom scenario (Hutchings & Quinney, 2015) with quizzes to indicate preparation for class. However, due to their learning to use information technology in less formal circumstances, additional training in critical thinking when using the internet as a research tool is needed (Hershatter & Epstein, 2010). Furthermore, while enjoying a less formal classroom structure and autonomy on when and where they work on assignments (Bergmann & Sams, 2012), they really seek and need structure and clarity on the processes, tasks and final expected deliverables in order to learn well (Hershatter & Epstein, 2010). This can to a certain extent be handled with personal interactions in the classroom by faculty where specific individual areas

of “opportunities for improvement” are addressed in a positive coaching fashion (Twenge J. , 2010; Hershatter & Epstein, 2010; Bergmann & Sams, 2012).

PRAGMATIC APPLICATION CONCERNS FOR STRATEGIC MANAGEMENT

Faculty members are faced with multiple desired outcomes while teaching a course beyond its being assigned to them. Three such issues are particularly important here: 1) Positive student evaluations for current year annual reviews and longer term tenure or contract renewal; 2) Meeting of assurance of learning goals; and 3) balancing time allocated to teaching, research and service. For this presentation, we will focus on the first of these three goal, Obtaining Positive Student Evaluations.

Current Student Evaluations of Faculty

For faculty, teaching evaluations matter. Extremely poor evaluations can derail a career. In general, college of businesses who are AACSB accredited have higher evaluations by students of their faculty than do non accredited colleges of business (Wilson, 2015). Appropriate touch used as a teaching tool has been found to increase attitudes toward the professor (Legg & Wilson, 2013). Actually, reading a positive “RateMyProfessor” profile also resulted in increased ratings on subsequent evaluations (Lewandowski, Higgins, & Nardone, 2012). Indeed, previous knowledge of positive evaluations of professors along with how well the student liked the professor just from a very short initial exposure was highly predictive of the final teaching evaluation received by the professor (Gross, et al., 2015). So basically, first impressions and reputation matter and are incredibly difficult to recover from if they are not glowing and alternatively harder to upset if they are glowing. Negative reputations of a professor can bias a class even in the face of disconfirming evidence (McNatt, 2010).

In fact, research has shown that there are pre-existing gender biases towards instructors when holding age and attractiveness constant (Nadler, Berry, & Stockdale, 2013). Nadler and his colleagues’ work indicated that initial impressions strongly predict end-of-term teaching evaluations. In disciplines

where there are a majority of male faculty, female faculty were perceived as less competent but easily recognizing and having familiarity with the female faculty members can attenuate this result (Nadler, Berry, & Stockdale, 2013). Such familiarity is not often found in larger public institutions. One must always remember that faculty are viewed by students from the students' own perspective filtered by their own particular educational tastes. If the students really liked the professor they gave strongly positive teaching evaluations and if they really disliked the professor, strongly negative teaching evaluations were given (Gross, Lakey, Edinger, Orehek, & Heffron, 2009). Their personal tastes strongly influenced whether or not they liked someone or a class (Gross, Lakey, Edinger, Orehek, & Heffron, 2009).

All of these issues create a body of evidence that student evaluations of teaching may not be accurate and may be based on things other than the correct design and administration of a course and support McNutt's conclusion that there is a strong need to proactively take action against any practices that might create unwarranted negative reputations (McNatt, 2010). This appears to be particularly the case when the student body is composed of students who are less mature and not as emotionally savvy (McNatt, 2010). Thus, students with low emotional intelligence and low assertiveness exasperate the problem while those with highly levels of emotional intelligence and higher levels of assertiveness mitigate the problem (McNatt, 2010).

From a pragmatic utilitarian perspective, faculty who have positive "RateMyProfessor" profile, whom the students consider attractive, whose style matches with the student tastes and expectations of the classroom and with whom the students are familiar are the faculty who are more likely to get higher student evaluations. The representative examples of a qualitative study of comments made on marketing professors (Hartman & Hunt, 2013) are examined and classified here into six categories. Two design categories(macro-structure and micro-content) , two professor-based categories (delivery and characteristics) and two student-based categories (taste for education process and affect with respect to

Table 1: Positive Comments Correlated with Higher Teaching Evaluations From "RateMyProfessor" (Hartman & Hunt, 2013)					
Class Structure	Class Concept	Delivery Style	Faculty Personal Characteristics	Student Taste	Affect statements
Provided real examples	Built my Skill set	Easy to Understand	Loves Marketing	Take this class with ***him***	Loved this class
Feedback was helpful		Welcoming	Knows Everything	Interesting class	Great Professor
Easy if you go to class		Very clear and organized	Lots of experience to share	Easy class	Liked *her* a lot
		Respects Student Opinions	Humble	Learned a lot	Nicest ***Guy*** you'll ever meet
		Willing to help	Hilarious	Better person after taking	
		Cares a lot about students		Inspired me to learn	
		Makes it interesting		Big Project was enjoyable	
		Very professional		A Cool ***Guy***	
		Dresses well			

relationships and those involved). Table 1 shows the classification of types of positive comments found when student comments are examined from across the United States. Comments based on the course design and the content of the course were the fewest type of positive statements at 13% (four out of thirty comments) in those two categories. Almost 47% of the comments related directly to the professor (14 out of 30). 64% of those comments related to the way in which the professor delivered the course material. 60% of the comments directly about the professor, and, of that 60% , 60% were related to knowledge or expertise. Twelve out of thirty (40%) were comments based on the students' perspectives. They either addressed comments related to the student's taste in education (67%) or comments about liking having a positive affect for the class or professor (33%). 13% of the comments were gender specific. 25% of those related to the female gender and 75% to the male gender.

Table 2 shows the classification of types of negative comments found when student comments are examined from across the United States.

Table 2: Negative Comments Correlated with Higher Teaching Evaluations From "RateMyProfessor" (Hartman & Hunt, 2013)

Class Structure	Class Concept	Delivery Style	Faculty Personal Characteristics	Student Taste	Affect statements
Discussed Irrelevant Material	Clueless about material	Boring class	Won't help after graduation	Hated this class	Bad Professor
Too many exams	Total Waste of Time	Tense Class	Doesn't like the subject	Don't Take ***him***	Nobody in class liked *her*
		Impossible to get Feedback	Has a bad attitude	Hard, Difficult	
		Presentation is scattered	Never worked in the real world	Had to Work Hard	
		Not helpful	Doesn't care about students	Made me not want to learn	
		Talks so softly you can't hear *her*	Full of *herself*	Jokes are not funny	
		Unprofessional	A total geek	Boring professor	
		Looks sloppy	*She*'s just mean		

Of the negative comments classified, 13% related to the course and its design and content and its perceived value. Fifty-three percent related directly to the professor whether in delivery style or personal characteristics. Half of those addressed negative delivery aspects. The other half addressed faculty personal attributes and characteristics. Thirty percent of the comments were from a student-based perspective. Just over 77% of those comments related to the students' taste in educational practices. About 22% of the student-based comments related to student affect about the professor. About 17% of the comments were gender specific. Of those comments, 20% related to men and 80% related to women.

Often when we examine behaviors we look for patterns. One pattern is a tit-for-tat pattern where there is congruence along the dimensions. Another pattern is one that displays a pattern of hygiene factors… its presence is good or bad but the opposite doesn't register. When the original coding schema and examples are used most follow the tit-for-tat pattern. They are congruent across the examples. When the six categories are compared via the number placed in each, we find that the delivery style of the professor and the taste for the educational style of the student display the tit-for-tat pattern. However, faculty personal characteristics has five (38%) positive examples and eight (62%) negative examples. This is beginning to shift to the pattern of negative personality characteristics triggering almost twice as many concepts as positive examples. Affect statements by students has the opposite trigger. About Thirty-three of the comments are negative and 67% are positive. In this instance, affect is triggered by liking and not by disliking. While comments about the course structure and content was steady across positive and negative comments, the number related to the macro course-structure element continued the positive trigger trend (60%: 40%) while the micro class concept category flipped to a negative trigger (33% positive to 67% negative).

This lets us know that students will be more likely to make negative comments if they have a female professor with personality characteristics that they don't like teaching a course that they don't like especially if they have to work hard or if the material is difficult for them. This scenario trips four of the triggers. They will most likely continue on to identify negative things in the course delivery style. Remember from earlier comments that begin familiar with the woman professor and hearing positive things about her will help to mitigate biases in the student evaluation.

Current Faculty Evaluation Issues Implications for Strategic Management

As noted earlier, the strategic management classroom may be organized as an integrative capstone course at the end of the student's career as a business student or as an introductory course to

be provided a foundational look and series of theories upon which to base their upcoming learning (Grant, 2008). Recently, faculty have been using more experiential exercises (Reutzel, Worthington, & Collings, 2012) or when the case studies are provided, they are limited scope and usually use to drive home a specific theoretical approach (Greiner, Bhambri, & Cummings, 2003). From the above faculty evaluation concern, the design and content only make minor contributions to student evaluations. Strategy because it is often considered a hard course because of its integrative nature and requirements of the use of calculations taught in earlier courses is often thought by students to be a "hard" course. This negative general reputation could sensitize the students to provide negative comments in the areas of student taste with a negative halo effect spilling that attitude over into other categories. There may be a stronger spill over and a longer term one if the faculty member is female and doesn't actively design elements into the course to elicit positive comments.

Integrating positive triggers (which can be a range of activities or even attitudes) with the earlier pedagogical tools that Millennial and iGeneration students respond well to is a good way to proactively address this category. We will begin with an integration incorporating course structure and content triggers. We will move to professionalism on the part of the instructor and attitudes to display. Throughout both of these we will weave in the student likes, dislikes, and tastes.

Ideally, the course (especially a last semester strategy course) begins with you entering an earlier course in a previous semester and providing an "expert" view of a strategic topic. Providing a professional presentation modeling the behaviors that you expect from students in strategy with short and interesting talk (similar to a Ted talk) may act as a short "trailer" for you and your course. A positive experience there, will help your teaching evaluations in subsequent courses!

Begin the actual course by having a welcoming start to the course that meets students' expectations with respect to the syllabus. Having a fairly simple straight forward syllabus helps a student

understand the structure of the course. You may want to offer students a choice of activities within a topic category to enable the attitude of “caring” and “respecting” students and those triggers to be an integral part of the opening of the course. Structurally having fewer exams and quizzes may enable another positive trigger. Having a term project and clearly stating how this project will help the student and why the student may find it interesting may help too.

As we as faculty members deliver the course, we need to provide professional business examples, at least initially, so that our expertise becomes established in their minds. Pointing out real world examples from text and popular press media along with sharing personal experiences will help students gain an understanding of your expertise. Providing obvious feedback that is explicitly stated to have a purpose to help the students be successful (perhaps by also offering help during non-feedback sessions) can reinforce that the faculty member cares about the students.

Students want the class to be interesting. Many times this is code for “not just sitting here and taking notes”. Remember, many students are inherently handicapped in notetaking by not knowing cursive. This means that note taking will not be easy for them and anything perceived as difficult begins to tip the scale to the negative orientation. So, have short lectures centered on graphics that they can copy and flesh out information with short phrases. Millennial and iGeneration students respond well to experiential exercises (again providing real world links) and the sharing of perspectives. While many of their assumptions need to be gently abandoned, this can be done with processes that they enjoy. If these exercises and activities build skills for them to use post-graduation, point that out to them. Detail how they can share these experiences after they graduate and how your feedback now helps them at that time too.

Finally be sure that all of your presentations and your handouts clearly relate to the topics of the day. Do not assume that the students will be able to tell how they relate, provide them in clear language

with the explanation of their reason for use, how to be used, and what to do with the deliverable or output of the exercise. Here is a time where feedback along the way may be very helpful for students. Seek out their opinions and comments and clearly tie them back into the activity. When possible deflect tension with a joke or gentle humor. Talk about how humor arises from a surprise and share some of the "office" humor if you are not a good jokester.

Layout each day and practice your parts whenever the course is new to you, you have a new major element, or if you are new to the profession. Planning each part and practicing it. Using presentation formats like you expect your students to use with the higher professional skills that you expect from strategy students, enables you to be a model of how they should present going forward. It doesn't hurt to confirm learning along the way (both in strategic processes and in content) and explicitly reinforce the learning subsequently, too.

This type of deliberate structure and delivery process along with being genuinely interested in each student will strengthen the chances of positive student evaluations. Next, we look at the faculty performance goal of meeting assurance of learning goals.

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Abstract Submission to SEDSI
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Title:

Qualitative examinations of supply chain collaboration and their contribution to the research stream

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Abstract:

This research presents a systematic review of the literature on qualitative examinations of supply chain collaboration. Qualitative research is essential to our understanding of how supply chain collaboration is executed and managed by and between supply chain partners. Qualitative research provides rich content data that allows researchers to use techniques such as those employing exploratory, narrative and phenomenological methodologies. Through a thorough review of the literature over the last ten years from 2007-2016 this paper seeks to answer the following research questions: R1) What are the most significant contributions of qualitative research to the supply chain collaboration research stream? R2) What are the key qualitative methods that are used in supply chain collaboration research? and, R3) What are the emerging gaps and opportunities for qualitative research regarding supply chain collaboration? There are few literature reviews regarding supply chain collaboration and, to date, there are none that explore specifically qualitative research in this literature stream. By learning more about the employed qualitative methodologies and their focus, we seek to provide researchers with data to support ideas for future research, propose new research questions and give insight into the journals and outlets that are publishing qualitative research in this area. Ultimately, this paper seeks to expand of our understanding of how qualitative research has been utilized in studying supply chain collaboration and explore ways that these methods can be used to continually improve our understanding of this important supply chain management phenomena.

Title: Repeatability and Reproducibility: A Study to Analyze the Precision of Assessing Tooth Preparations

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Abstract:
Key components of tooth preparation for indirect dental restorations (crowns) include adequate tooth reduction and smooth surface finish. Tooth preparations have been traditionally assessed and grades awarded through visual inspection, and the judgement and expertise of faculty. Because of subjectivity and potential inconsistencies, faculty utilize tools to calibrate the scoring process whenever possible. This becomes important as National Board Dental Examinations are considering using CAD/CAM (computer-assisted design and computer-assisted manufacturing) scanners and software for assessing indirect restoration preparations for licensure. The purpose of this research is to assess the intra-observer repeatability and the inter-observer reproducibility quality outcome measures for tooth preparations to evaluate scoring process consistency.

Material and Methods: Onlay and crown preparations were scored across six dimensions: occlusal reduction, anatomic form, finish line, axial reduction/internal box form, path of draw, and preparation finish using a standardized scoring rubric. Quality outcome standards associated with a (double blind) sample of 50 teeth produced by third-year dental students as part of a CAD/CAM course were assessed and grades assigned (for each dimension per tooth, three times each, randomly sequenced) by two faculty members. Preparation depth (axial reduction) was evaluated using standardized depth dimensions (2 mm) with a periodontal probe and rounded angles were assessed using an explorer. A standardized depth gauge was used to measure occlusal clearance/reduction (2mm functional cusp (fc), 1.5mm non-fc). An ordinal measurement system was used to evaluate each tooth with a letter grade (A through F). Statistical analysis was done using Kendall's Coefficient of Concordance (*W*) ranging from 0 to 1. A coefficient value of 1 indicates perfect agreement while a coefficient of 0 indicates the agreement is random.

Results: Research revealed a significant difference in evaluator repeatability and reproducibility levels across dimensions. Faculty members' intra-observer repeatability was highest for repeated measurement of occlusal reduction, axial reduction, and finish of prep, though in all instances measures could only be classified as marginally acceptable (*W*=0.7 to <0.9). Measures in the other three categories were deemed unacceptable (W<0.7). Reproducibility was found to be generally weaker than repeatability across dimensions. Reproducibility measures were deemed marginally acceptable in one dimension (*W*=0.7 to <0.9) and unacceptable (W<0.7) across the remaining five dimensions.

Conclusion: Despite the expertise and diligence of the faculty members, the study revealed a significant level of inconsistency associated with visual grading tooth preparations using a grading rubric even with calibrated tools. Our findings yield important details of grading variance associated with the grading dimensions both within and between evaluators. The results suggest that visual inspection as a grade measurement system is insufficient for assessing student tooth preparations and that a more objective measuring system through the use of CAD/CAM preparation scanning may be more repeatable and reproducible. Further research is needed.

Resources for Teaching Sustainability

Marilyn Smith, Winthrop University

Teaching sustainability to business students begins with introducing the triple bottom line (people, profit, and planet), and immediately emphasizing the interrelationships between people, profit and planet. That is, organizations will not consider these separately, but rather look at ways to increase profit (perhaps by reducing cost), at the same time they are benefiting people (employees, customers, the community), while if not improving the planet conditions, at least making sure they are minimizing future harm. Google Images provides a wealth of illustrations, mostly colorful Venn diagrams, to show the interrelationships by either searching by "triple bottom line of sustainability" or "triple bottom line people planet profit". The resources below will be described, discussed, and/or demonstrated during the tutorial, while inviting participants to share their experiences.

Depending on the level of the student and the course, it may be appropriate to introduce the UN Global Compact, "the world's largest corporate sustainability initiative." The Compact lays out five "essential elements of corporate sustainability":

1. Operate responsibly in alignment with universal principles (principled business).
2. Take strategic actions that support the society around them (strengthen society).
3. Push sustainability deep into the corporate identity and commit at the highest level (leadership commitment).
4. Report annually on their efforts (reporting progress).
5. Engage locally where they have a presence (local action).

These five elements are described in more detail in the 48 page "Guide to Corporate Sustainability: Shaping a Sustainable Future" (United Nations Global Compact).

The Dow Jones Sustainability Indices (DJSI) provide a quick way to identify companies which are leaders in sustainability for research and teaching examples. The indices were stated in 1999 and are now jointly operated by RobecoSAM and DJSI to offer "benchmarks for investors who integrate sustainability considerations into their portfolios, and provide an effective engagement platform for companies who want to adopt sustainable best practices." (Dow Jones Sustainability Indices)

Duke Energy, the largest electric provider in the country, provides the online Energy Challenge to demonstrate the trade-offs they face trying to meet customer demand for electricity, while doing that at the lowest cost to consumers, yet making a profit for shareholders, and protecting the planet for all. For example, coal is cheap and efficient, but pollutes the air and produces ash. Some citizens have safety concerns about nuclear energy, based on an accident at Three Mile Island in 1979 and the impact of the 2011 tsunami in Japan. Solar and biomass options are safe, but not as efficient as coal or nuclear. The Energy Challenge can be played as a game by individuals or groups to see who can do the best job of making decisions to balance the trade-offs. The challenge begins with the 2010 energy production, the expected demand by 2050, and the current annual CO^2 emissions. The Challenge tracks respective costs of changes selected, the impact on CO^2 emissions, and the effect on energy production, as the player starts to choose between:

- Build new power plants, solar or wind farms.
- Upgrade and/or retro fit current power plants. However, some of the older, smaller plants cannot be retrofitted due to the cost.

- Close current power plants.
- Implement new energy efficiency programs. (Duke Energy)

Three of the International Organization for Standardization (ISO) categories are directly or indirectly related to sustainability.

- ISO 14000 Environmental management "provides practical tools for companies and organizations of all kinds looking to manage their environmental responsibilities".
- ISO 26000 Social Responsibility is based on the premise that business shares a relationship with society and the environment with guidance on operating "in an ethical and transparent way that contributes to the health and welfare of society".
- ISO 50001 Energy Management helps companies:
  - Develop a policy for more efficient use of energy
  - Fix targets and objectives to meet the policy
  - Use data to better understand and make decisions about energy use
  - Measure the results
  - Review how well the policy works, and
  - Continually improve energy management.

The United States Green Business Council offers Leadership in Energy and Environmental Design (LEED) certification for buildings (homes to corporate headquarters). It is important to note for students that LEED takes a long term and holistic approach; not using recycled materials or materials that can be recycled. It will also interest students when they can identify LEED certified buildings on their campus or in the immediate community. LEED Version 4 considers:

- "Materials to get a better understanding of what's in them and the effect those components have on human health and the environment.
- A more performance-based approach to indoor environmental quality to ensure improved occupant comfort.
- Brings the benefits of smart grid thinking to the forefront with a credit that rewards projects for participating in demand response programs.
- Provides a clearer picture of water efficiency by evaluating total building water use."

State agencies also give assistance to organizations related to sustainability. For example, in South Carolina, the South Carolina Department of Health and Environmental Control's Green Hospitality Program works with the largest industry in the state to "reduce the environmental impact of its operations and incorporate environmental stewardship and sustainability in its business practices." Also, the Poole College of Management at North Carolina State University established the Business Sustainability Collaborative to develop "leaders who can apply research, technology, and critical thinking to drive and measure sustainable business practices" through "experiential learning, career, development, academic and applied research, and partnership opportunities."

The tutorial will include three simple cases which can be used to demonstrate decisions that impact the tripe bottom line. In the first case, a local band booster club decided to stop offering lids and straws with sodas at their concession fund raising, unless requested by the customer. The second case shows the benefits when the owner of a local submarine sandwich shop started composting food waste, and using it to grow tomatoes to be used on sandwiches. The third example deals with a packaging change from a glass peanut jar to plastic to a lighter plastic.

The GoodGuide mobile app provides an in-class activity for demonstrating the health, environmental, and social performance of over 120,000 foods, personal care, and household products. The app is free, so the students can quickly download it, and I have my phone with me when I cover this topic. I take a shopping bag of empty packages and bottles, such as soda, water, shampoo, household cleaners, snacks, etc. The app uses the phone camera to scan the bar code, and then provides the rating in the three areas, as well as an overall rating. The website tells what the ratings mean and how they and determined (methodology). The class then compares the ratings to our perceptions and discusses how much these rating would impact purchase decisions.

Part of teaching sustainability involves using examples of leading companies. A short list would include BMW, Patagonia, New Belgium, Nike, and Timbuk2, which includes large international and small private companies. During the tutorial the group can share and brainstorm companies that make good examples.

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Additional Resources

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Retirement Analysis

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ABSTRACT

This study considers the net worth of the current generation at the retirement age of sixty five. Using government statistics on factors shown to affect income such as race, gender, life expectancy, education, inheritance, debt, savings rate, and stock returns, a Monte Carlo simulation is used to derive a model that estimates an individual's net worth at age sixty five. The study is unique in that it considers the impact of ethnicity on retirement.

INTRODUCTION

Currently there are ten thousand people retiring every week in America (Rhee 2013), and the National Institute of Retirement Security reports that 84 percent of them are not saving enough for retirement. Challenges to the validity of many research papers dealing with retirement rest on the premise that numbers ignore key factors in the savings process (Pang and Scheiber, 2014). Research shows that nearly half the population of baby boomers are at risk of having inadequate resources at retirement, a number driven up more than twenty percent during the Great Recession. The social security administration's own numbers as of the middle of 2014 document that 52% of married couples and 74% of single persons receive 50% or more of retirement income from social security.

Several researchers suggest that retirement prospects have deteriorated markedly for the current younger generations. Retirement income gap is defined as the difference between income available and money needed to maintain the standard of living past retirement. The narrative for each succeeding generation appears to be similar. In 2014 VanDerhei and Copeland (2003, 2010) estimated the early baby boom generation had a retirement income gap of 43.3 percent, late baby boomers showed a gap of 42.5 percent, while Generation X had a gap of 42.2 percent. All are at risk on having insufficient retirement income to meet their basic retirement needs. While some researchers paint a rosier picture, Scholz, Seshadri and Gales (2009) believe only 25 percent of early baby boomers will face the retirement income gap.

The validity of the previous papers cannot legitimately be debated without first considering the factors that led these generations to their current state of wealth. There is a need to develop a time-dependent model based on variables that impact income to help predict changes in wealth over time.

Research on lifetime earnings and consumptions has been ongoing for over sixty years (Modigliani and Brumberg, 1954). Studies have employed a myriad of methodologies to predict retirement wealth for future generations. Aguilar and Hurst (2005) life cycle studies provide insight into consumption changes throughout one's life. Numerous other investigations [McGill (1964), Batelsmit et. al (2013), Poterba et al (2011), and Bernheim et al (2001)] discuss variables that impact retirement wealth, including retirement income adequacy measures.

Batelsmit et al (2013), Topoleski (2013), and Pang and Schieber (2014) suggest key variables needed to determining the retirement income. The list includes longevity, level of debt, investment returns, earnings

history, education level, savings rate, annual expenses and retirement age. Other externalities include taxes, social security costs and benefits, inflation, unforeseen wealth shocks, family size, home ownership, cost of health care and long-term care. While the government sources provide a plethora of data on several of these measures from the beginning of an American's work life, at age 18, to retirement at age 65, no previous study has used it to map the wealth process over a person's lifetime.

Using data taken exclusively from U.S. government reported sources, the authors used many of the variables listed above and ran Monte Carlo simulations to examine concurrently how nine different variables might impact retirement wealth differently. This study is unique in that it also considers the impact of ethnicity. This paper focuses on the wealth building aspect of retirement and not the externalities like social benefit programs, which would require an entirely new set of assumptions about the standard of living requirements many years down the road. The authors felt that the variability of those factors makes it difficult to predict with any certainty what the future outcomes or needs might be. A comparison is then made of the modeled accumulated wealth to the current wealth data by the baby boom generation. By creating a model that replicates the wealth accumulated by current generations, the authors were able to observe the individual and collective impact of all variables impacting wealth generation. The authors used key historical data to validate their simulation model. Details of the data collection method, modeling, results and conclusions are presented in the following sections.

DATA COLLECTION

The variables considered in the simulation model were all referenced in previous research studies. The list includes: life expectancy, education, income, savings rates and investment returns. Our model improves upon previous research studies by including data that has historically been ignored. We consider race, gender, inheritance, levels of debt, home ownership, marriage rates at retirement, equity in homes at retirement (for homeowners), and the cost of debt. The data collected represents information drawn from large, government information sources over extended time periods. On average, the data sets typically cover time periods of forty years or more, and include information such as quintiles and age related data. The large volumes of data enabled us to run large Monte Carlo simulations that helped us explore the impact of our model variables, individually and collectively, over their entire value ranges.

The following sections discuss the details of each variable's potential values and their incorporation into the simulation model.

Race

The CIA World Fact Book [1] provides world-wide data organized by country. For the US, it has data as recent as July 2014. Table 2 shows the data corrected for the Hispanics portion of the 2014 population (15.1%). To include the race variable into the simulation model, the RANDBETWEEN(1,10000) statement was used to generate a random number between 1 and 10,000. Since the percentage representation for each race was known, every random number got mapped onto a particular race outcome (see Table 2). For instance, the random# 7582 would correspond to a HISPANIC birth.

Gender

At birth, according the CIA World Fact Book [1], the male/female ratio in the US is 51.1% to 48.9%. To include the gender variable into the simulation model, the same RANDBETWEEN(1,1000) statement was used to generate a random# between 1 and 1000, and then mapped into a particular gender based on that value (see Table 3). The random# 489 would, for example, correspond to a MALE.

Life Expectancy

The Federal Government provides data for life expectancy and probability of death rate at any age. In 2009, U.S. actuarial data shows values for these variables ranging from birth to age 119. Since the data for probabilities goes to six decimal places, the data was converted to whole numbers by multiplying it by a million. At any age, the actuarial data was compared to the random number generated using the command RANDBETWEEN (1, 1000000). A random number greater than actuarial table value implied that the modeling subject would continue to live. By implementing this logic continuously starting at birth, we determined an age of death for the modeling subject at hand. The results can be seen in Table 4. For instance, in the example shown, the modeling subject dies at age 87.

Education

The Federal Government also provides detailed statistics with regard to education. Specifically, it provides information by race and age in four educational categories: less than high school, high school, less than college, and college. The age categories are 18-24, 24-54, 55-64, and 65-above. Information is provided for several racial categories including: Whites, Hispanics, Blacks, Asians, and Other. The available tables were summarized, regrouped, and made accessible via the VLOOKUP command. Table 5 provides a look at these numbers. For a person of a given race, a random number determines their educational qualification at any age based on the probabilities provided. Coding was added to ensure that the educational level of an individual could hold steady or go up – but never go down with age.

Inheritance

People of all races have the chance to inherit wealth. The percentage of people that inherit wealth and the amount of wealth inherited varies significantly by race, according to the Center for Retirement Research at Boston College. For Blacks and Hispanics, the median amount received as an inheritance is $7,500, while for Asians its $75,000 and for Whites its $175,000. As well, the point in their lives where a subject received the inheritance was also randomly assigned based upon the distribution of inheritance by age. When a subject receives the inheritance can have a large impact on their final wealth at age 65.

A significant portion of the wealth inherited is in the form of real estate. A quick analysis of the data suggested that most of the inherited wealth had a 70-30 split, where 70% represented real-estate wealth and 30% represented stock-market investments. The former changed values over the years based on a random selection from the national real-estate value growth rate swings, while the latter was kept in sync with the stock market indices randomly generated returns as based on a 50-year distribution of returns for the S&P 500 index. These numbers became part of the value of wealth at age 65 based on the racial

profile, randomly selected growth rates for each assets' distribution of returns and time until retirement. Table 6 shows the details of this process.

Debt

Based on the latest Federal Data available (2010), 70% of people carry debts, while 30% do not. The amount of average debt carried varies by age, race and income. The data indicates that the average debts grow up to age 40 and then start to drop. To reflect this fact, debt amounts representing the averages of each age groups, the median of which for the population were $45,300, $62,700, -$21,500, -$16,500, and -$44,000 were added in years 35, 40, 50, 60, and 65 respectively. The negative amounts reflect the fact that debt was being reduced (see Table 7). Further, adjustments based on race, education and age were also included in the modelling. For these numbers, the median for the middle decile for debt was used as the start value, before being adjusted by the other three variables. Numbers for all the various ethnicities grew dramatically after the third decile. Because earnings and debt levels are highly skewed distributions, and we only used the median income based on education, the middle decile seemed most appropriate. Simulations were run at the higher levels, but efforts to adjust other variables to achieve the level of wealth currently reported proved to be intractable.

Earnings

Median monthly earnings varied by education, gender, and age according to U.S. Bureau of Labor Statistics. The tables were summarized, regrouped, and made accessible via VLOOKUP command. The four categories of education level – less than high school, high school, less than college, and college and the four categories of age groups 18-24, 24-54, 55-64, and 65-above were used in the model. Median levels of income were used due to the high skew inherent to the earnings rates. Table 8 shows the details of incorporating this variable into the model.

Savings Rate

The savings rate in the United States has varied widely over the last 40 years. A study of historic savings data finds the savings rate varying between 3% and 13%. Using the frequency of occurrence of the rate as a proxy for the probability, the savings rate information was converted to a VLOOKUP table. The value of a randomly generated number using the RAND() function determined the savings rate for any given year. Table 9 shows this information.

Stock Returns

The average yearly stock returns over the 1964-2014 period have ranged between -37.5% and 32.5%. By using their frequency of occurrence as a proxy for probability, the stock returns information was converted to a VLOOKUP table. The value of a randomly generated number using the RAND(} function determined the stock returns for any year. The returns and frequency distribution is shown in Table 10.

Modeling

The U.S. census bureau publishes information based on each decennial report, the most recent one was based on the 2010 census. Information on wealth and debt information was published based on race,

income, education and age. While information about each population's wealth as a function of the median for each population and individual information about each race and age is published, a final breakdown of wealth by race and age is not available. Relationships among the age groups was computed to arrive at the nest egg available for each race at age 65. The extrapolated data as well as the computed from the retirement data is contained in table 13. A second source based on information acquired from a large survey done by the Federal Reserve System call the 2013 SFC Chart book is checked to give an additional reference point. This survey only includes white and non-white numbers, thus only the white as a group is given below the other government data. Finally, a report by the U.S. Census Bureau, Survey of Income and Program Participation broke down total wealth into financial assets and real assets. This data from 2010 was updated using the change in the CPI to arrive at 2013 data. Finally a report by the Federal Reserve Board of St. Louis, "The Demographics of Wealth", dated February, 2015, was also referenced though the numbers by race for financial wealth were given in very broad terms. While the previous study numbers vary widely due to the numerous external factors, many of the age groups fit well within the parameters of our model outputs.

Monte Carlo simulations (25,000) representing a cross section of Americans from all races, sex, and education levels were run using this path dependent process. The age or mortality of the subject is first. Next the race and gender are selected as they have a significant impact on the path for several other variables. The level of education is then randomly drawn so inference about the income path to follow can be determined. As was stated previously education is allowed to increase based on the probability drawn from the race population with upward movements having an immediate upward adjustment for both income and debt. For each subject a random savings rate is selected which is subsequently carried forward throughout that person's life. This seemed reasonable to assumed because even while savings rates do change both during life events like illness or unemployment, and throughout a person's movement through life (older individuals tend to have higher savings rates), the habit of savings money is likely ingrained in a person's life from an early age.

Based on an annual savings rate and an interest cost of debt, the total money set aside into funds for retirement could be positive or negative. If the fund was negative, no return was given for the stock portfolio to not impact its growth in a negative way. If the stock portfolio had a positive value, it was allowed to grow at a randomly generated return based on previous distributions of stock returns.

Inheritance was a randomly generated number from the probability distribution for each given race. It was capped at $500,000 as that was the median for the top quintile of the population listed from U.S. Census data. The date in the subject's life when the distribution was received was also generated by a random selection process based on the distribution of inheritance ages given by the Census Bureau.

By looking at the historical data and sensitizing the model variable cost of debt, we were able to compute an overall level of wealth. However, given that the stock returns used were nominal, not real returns, the total financial savings calculated by the model could then be brought back to compare the numbers to the actual numbers shown in 2014 dollars, thus enabling a more direct comparison. Since

the purpose of the study is to consider wealth, not spending, simulated savings rates invested over time seemed likely to best reflect the total inflation impacted level on wealth.

The only number that was not derived directly from the federal surveys was the cost of debt. Thus this number served as our control figure to determine what levels of wealth would be accumulated by race. While the final financial wealth at age 65 was extremely sensitive to changes in cost of debt, by varying these numbers we determined interest rates that were needed by race to achieve current levels of wealth based on the national numbers. The overall cost of debt over the lifetime for each ethnicity is included in the final wealth table. Recent checks of various types of debt including mortgage, credit card and school loans showed a credit spread based on various credit scores ranging from 255 and 150 basis points for school loans and mortgage loans, to as many as 700 and 1160 basis points for revolving credit cards and auto loans. Given credit scores are highly correlated with income, which in turn is dependent upon education, it makes sense that the highest education level attainment by Asians would have the lowest cost of debt. Consequently, the lowest level of education attainment by Blacks and Hispanics would also have the highest carrying costs on debt.

Home ownership in America is not uniform among the races. This impacts the wealth of the different ethnicities in a non-uniform way, given that 69-76 % of the final wealth at age 65 is due to home ownership. Asians and Whites have nearly identical home ownership rates at just over 72%. Blacks and Hispanics are recently tracking between 42% and 45% on home ownership rates. With home ownership rate for Whites and Asians are on average about 30% greater than that for Blacks and Hispanics, and the cost of debt for home mortgages has historically been the lowest form of borrowing, it would be expected that the average cost of debt for Asians and Whites would be lower.

It is worth noting that home ownership levels have varied significantly over the last 20 years due to an exceptionally easy mortgage market leading up to the financial crisis. The two groups hurt the most by foreclosures after the mortgage market collapse in 2008 were Blacks and Hispanics. Home values also vary by race with the median home value for Whites and Asians averaging $180,000, with Blacks and Hispanic homes averaging less, approximately $143,000. Equity in Homeownership at age 65 is on average approximately 90% of its total value across all groups.

Marriage rates among the different racial groups varies widely as well. Given that the numbers for retirement wealth reported by the federal reserve data is by household, it was necessary to consider family formation to have number on an equal basis. Asians have the highest marriage rate at 76% followed by Whites at 73%. Hispanics are also married at a high rate of 71% followed by Others at 65% and Blacks at 59%.

It is important to note that certain variables, such as inflation, were not in the initial calculations into the model, particularly at it relates to wage inflation. Instead, after the numbers were calculated, the resulting financial asset figures were reduced by the average impact of inflation, namely the 3.72% average rate over the last 30 years.

Results

Our model suggests (Table 12) that the model, given the cost of debt in the far-right column, does a good job of predicting what the levels of financial wealth will be for each race. The mean retirement financial wealth per household will average $26,446 on an inflation adjusted basis[1]. This is slightly higher than the government figure of $22,878.

For Whites and Asians the story is slightly better with average financial wealth of $6,571 above the government figure and $605 on average above for Blacks and Hispanics. Overall given the length of time, adjustments for inflation and different numbers among the various government measures, the model does an excellent job of predicting financial outcomes. As can be seen from the far right figures, given the time frame for interest rates among the various different debt facilities, the average debt by race seems both reasonable and well within the range of what credit scoring might suggest given different incomes and home ownership rates.

Current Census bureau data puts the average American home value at approximately $160,000. Given previous generational data we know that approximately 90% of the population of retirees will own their homes outright at age 65. These numbers are not, however equivalent across all ethnicities. As seen in Table 13, home ownership by race as of Q4 of 2014 showed a large bias against home ownership for both Blacks and Hispanics. The median home value, while at $160,000 is divided unequally among the races. Whites and Asians on average own homes worth $180,000 while Blacks and Hispanics have an median home value of $143,000. With an average home equity level for the entire population, we adjust the home value scaled by ownership number against the 90% level of equity to arrive at the final column numbers which show the home asset value by race at age 65.

The combined level of wealth by ethnicity shows that the average total wealth for the population using the model is comparable to the average level of wealth calculated using government figures, $112,892 verses $103,097. Not all parts of the population will fair equally well. For Whites and Asians the calculated numbers are within $10,000 of the government figures, averaging approximately $156,000 of combined wealth at retirement. Hispanics and Blacks averaged about half that number, approximately $68,500. The level of total wealth for Blacks was the one figure that the model varied significantly compared to the government figures, $67,348 versus $34,160**.** The difference lies in the home asset values given that the difference in financial assets was just $2,644 in favor of the model.

The bulk of this disparity represents three differences between the Hispanic and Black populations relative to the White and Asian groups. A higher level of education self-selects individuals into earnings groups regardless of ethnicity. The only difference is historical numbers show a smaller number of college degrees for the two minority groups. Secondly, the amount of wealth transferred inter-

[1] The forty year average inflation rate has been 3.71%. The adjustment factor to bring back the future values equations to 0.232.

generationally was significant. Half of both the Hispanic and Black populations inherit $7,500 or less while that number for Asians is $75,000 and Whites is $175000. Given the average age of inheritance for the entire sample is 52 years of age, in a present value sense it represents a difference for the financial assets of $ 27,275 for Asians and $60,237 for Whites. The difference in total wealth between Blacks/Hispanics and whites, would shrink to approximately $25,000 were it not for inheritance. Lastly, with home ownership rates being significantly lower among minorities this has a major impact on the wealth they will have accumulated in that particular real asset class.

Conclusion

Li, Hurd, and Loughran (2008) find that individuals who enjoy a higher socioeconomic status tend to work longer than lower socioeconomic status individuals. To the extent that this trend continues into the future, the groups of individuals who are less educated, unmarried and who happen to not inherit much wealth may well face the future that Sass (2008) predicts where the solution to their retirement income problem might be forced prolonged workforce participation.

The major differences in wealth among the different races lies in the multiple small choices each group has tended to make. Lower levels of education, differences in inheritances and higher cost of debt over a lifetime can turn into much lower levels of wealth. There are also differences in how the various ethnicities approach many life choices. Blacks on average had the lowest levels of debt across all quintiles of wealth while Asians tended to have the highest. The marriage rate among Blacks was also lower, as was home ownership. How much of these difference is driven by economic circumstance verses choice is difficult to say, but that is at least what the number in the middle decile shows. Overall the model as developed did a good job of predicting levels of wealth among the races. Though there is no way of calculating the standard deviation of the government figures given the nature of their interpolation, it is likely the small difference over a 40-year period would not be such that the hypothesis that the difference in the numbers being zero could not be rejected.

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RACE	PERCENTAGE	POPULAT ION
White	67.89%	216,483,221
Hispa nics	15.10%	48,152,708
Black	10.91%	34,790,012
Asian	3.76%	11 ,993,755
Others	2.34%	7,472,407

Table 2: US Population with the Hispan ics Category

RACE	PERCENT	RANDOM# RANGE
Whit e	67.89% ,	l to 6789
Hispanic	15.10%	6790 to 8299
Black	10.91%	8300 to 9390
Asian	3.76%	9391to 9766
Other	2.34%	9767to 10000

Table 3: Incorporat ing RACE Into the M odel

GENDER	PERCENT	RANDOM# RANGE
Male	51.1%	1 to 511
Female	48.90%	512 to 1000

Table 4: Incorporating GENDER into the Model

Life= 87

AGE	Deaths per Million	RANDOM	STATUS	**LIFE**
0	5728	624900	ALIVE	0
1	373	368056	ALIVE	1
2	241	120545	ALIVE	2
3	186	892568	ALIVE	3
4	150	17135	ALIVE	4
5	133	852825	ALIVE	5
6	121	34720	ALIVE	6
7	112	654686	ALIVE	7
8	104	591871	ALIVE	8
9	98	72045	ALIVE	9
10	94	920621	ALIVE	10
11	98	11651	ALIVE	11
12	114	64909	ALIVE	12
13	143	57003	ALIVE	13
14	183	611210	ALIVE	14
15	229	117753	ALIVE	15
--	--	--	--	--
83	60661	598705	ALIVE	83
84	67751	835015	ALIVE	84
85	75729	300493	ALIVE	85
86	84673	789223	ALIVE	86
87	94645	8687	ALIVE	87
88	105894	941129	DEAD	0
89	117853	605671	DEAD	0
--	--	--	--	--
116	760720	490663	DEAD	0
117	806363	753192	DEAD	0
118	851378	671758	DEAD	0
119	893947	256371	DEAD	0

Table 5: Incorporating life Expectancy into the Model

WHITES				
	<HS (1)	HS(2)	<Coll (3)	Coll (4)
18-24	17.08%	27.05%	45.15%	10.72 %
25-54	10.61%	27.71%	27.63 %	34.05%
55 -64	8.64%	30.56%	28.23%	32.56%
65-	15.70%	35.26%	22.93%	26.11%

HISPAN ICS				
	<HS (1)	HS(2)	<Coll (3)	Coll (4)
18-24	25.91%	32.38%	37.62%	4.09 %
25-54	30.90%	31.65%	21.66%	15.79%
55 -64	37.60%	26.92%	20.63 %	14.85%
65-	49.13%	26.26%	14.39 %	10.22%

BLACKS				
	<HS (1)	HS(2)	<Coll (3)	Coll (4)
18-24	21.00%	32.55%	41.57%	4.88 %
25-54	11.36%	32.59%	32.30%	23.76%
55-64	15.54%	34.94%	28.78 %	20.74%
65-	28.91%	35.92%	20.59%	14.58%

ASIANS				
	<HS (1)	HS(2)	<Coll (3)	Coll (4)
18-24	11.52%	15.66%	53.02%	19.80%
25-54	6.40%	15.87%	18.10%	59.63%
55 -64	11.99 %	28.64%	17.45%	41.92%
65-	23.98 %	26.56%	13.79 %	35.67 %

OTHERS				
	<HS (1)	HS(2)	<Coll (3)	Coll (4)
18-24	18.61%	33.34%	42.96%	5.1 0%
25-54	1 4.58%	30.46%	32.32%	22.64%
55 -64	1 5.23%	31.81%	30.08%	22.88%
65-	30.25%	31.60%	21.79%	16.36%

(Ta b le tra ns pose d a nd converted for VLOO KUP)

18-24	25-54	55-64	65-+	EDU
0.0000	0.0000	0.0000	0.0000	1
0.1708	0.1061	0.0864	0.1570	2
0.4413	0.3832	0.3921	0.5096	3
0.8928	0.6595	0.6744	0.7389	4
18-24	25-54	55-64	65-+	EDU
0.0000	0.0000	0.0000	0.0000	1
0.2591	0.3090	0.3760	0.4913	2
0.5829	0.6255	0.6452	0.7539	3
0.9591	0.8421	0.8515	0.8978	4
18-24	25-54	55-64	65-+	EDU
0.0000	0.0000	0.0000	0.0000	1
0.2100	0.1136	0.1554	0.2891	2
0.5355	0.4395	0.5048	0.6483	3
0.9512	0.7624	0.7926	0.8542	4
18-24	25-54	55-64	65-+	EDU
0.0000	0.0000	0.0000	0.0000	1
0.1152	0.0640	0.1199	0.2398	2
0.2718	0.2227	0.4063	0.5054	3
0.8020	0.4037	0.5808	0.6433	4
18-24	25-54	55-64	65-+	EDU
0.000	0.000	0.000	0.000	1
0.1 86	0.14 6	0.1 5 2	0.302	2
0.5 1 9	0.4 5 0	0.470	0.619	3
0.949	0.774	0.771	0.836	4

Table 6: Incorporating Educ ation into the M odel

Amount	$0	$2 500	$7 500	$17 500	$3,7 500	$7,5 000	$175 000	$37,5 000	$500 000
White	13.7%	6.8%	3.9%	6.0%	6.7%	10.8%	20.1%	15.1%	16.9%
Hispanic	28.5%	16.5%	7.4%	8.4%	8.0%	9.9%	11.2%	6.1%	3.9%
Bla ck	33 .5%	14.6%	7.0%	7.9%	6.6%	9.0%	12.6%	5.6%	3.3%
Asian	15.4%	9.0%	5.5%	6.6%	7.2%	8.2%	17.0%	13.8%	17.3%
Other	25.5%	13.1%	7.2%	6.3%	8.0%	11.9%	15.2%	7.5%	5.4%

(Table transposed and convert ed to cumulative form for" VLOOKUP")

White	H ispan ic	Blac k	Asian	Other	Amount
0.000	0.000	0.000	0.000	0.000	0
0.137	0.285	0.335	0.154	0.255	2500
0.205	0.450	0.481	0.243	0.386	7500
0.244	0.524	0.551	0.299	0.457	17500
0.304	0.608	0.630	0.364	0.520	37500
0.371	0.688	0.695	0.437	0.600	75000
0.479	0.787	0.786	0.519	0.719	175000
0.680	0.899	0.911	0.689	0.871	375000
0.831	0.961	0.967	0.827	0.946	500000

Table 7: Inco rpo rating Inhe ritances into the Mo de l

70%oif People Have Debts, 30% Don't RANDd o 1242 DEBT YES

AGE	D EBT
<35	$ 4,5 30 0
35- 44 Yea	$10 6,00 0
45 to 54 YE	$8,5 500
55 to 64 YE	$70,00 0
55+ Yea rs	$25,0 00

AGE	Differential
35	45300
40	6,270 0
50	- 21 50 0
60	-1 550 0
55	-440 00

Ta ble 8: lnm rpo rat ing Debt int o t he Model

MEDIAN MONTHLY EARNINGS (MEN)

EDUCATI ON:	<HS	HS	«iColl	Coll
18-24 Years	802	1,516	1, 400	2,900
25,-34 Years	1,758	2,400	2,917	4, 536
35-44 Years	1,992	*1,814*	3,727	6,000
45,-54 Years	2,176	3, 167	3,833	6,400
55-64 Years	2,120	3, 000	3, 529	5,833
65.+Years	1,750	1,330	1,961	**4,000**

(Tab l e Conv ert ed fo r VI!OO KUP)

MEN	1	*1*	3	4
0	802	1,516	1,400	2,900
25	1,758	2,400	2,917	4,536
35	1,992	2,824	3,727	6,000
45	2,176	3,167	3,833	6, 400
55	2,120	3,000	3,529	5,833
65	1,750	1,330	1,961	**4,000**
,68				

M EDIA N MONTHLY EARNINGS (WOMEN)

EDUCATI ON:	<HS	HS	«iColl	Coll
18-24 Years	520	1, 200	1,111	2,484
25,-34 Years	1,200	1,728	2,063	3,,540
35-44 Years	1,299	1,833	2, 360	4,088
45,-54 Years	1,400	2,162	2,598	4, 187
55-64 Years	1,386	2,048	2,500	4,123
65.+ Years	972	1,324	1,200	2,300

WOMEN	1	2	3	4
0	5:W	1,200	1,111	2,484
25	1,200	1,728	2,063	3,540
35	1,299	1,833	2,300	**4,088**
45	1,400	2,162	2,598	4,187
55	1,386	2,048	2,500	4, 123
,65	972	1,324	1,200	2,300
68				

Tabl e 9: Incorpora t ing Earn ings in t he M odel

SAVINGS%	PROB	CUM ULATIVE
3%	0.06	0.06
5%	0.26	0.32
7%	0.18	0.50
9%	0.12	0.62
11%	0.24	0.8,6
13%	0.14	1.00

VLOOKUP TABLE

CUM ULATIVI	SAVINGS
0 .00	3%
0.0 6	5%
0.32	7%
0.50	9%
0.62	11%
0.86	13%

Table JII.O: Incorporating Savings Rate into the Model

Stock Market Returns	
VILOOIKUIP TABLE	
Cumulative	Return
0	--0 .375
2%	-0 .3 25
2%	-0 .275
4:%	--0. 225
6%	-0 .175
8%	--0 . 1 25
18%	-0 .0 75
22%	-0.0 25
26%	0.025
40%	0.075
48%	0.125
66%	0.175
74:%	0.2.25
80%	0.2.75
94%	0.325

fable Jll.l: Incorporating Stock Returns into the Mode l

Table 12
Results for Nest Egg End of Life with/without inflation

Race	NESTEGG65	(Inflation Adjusted) 3.72%	Government Figures	Debt Rate
Asian	$153,124	$35,525	$30,912	5.75%
Hispanic	$57,953	$13,445	$9,591	10.50%
Black	$56,749	$13,166	$15,810	11.50%
White	$188,480	$43,727	$35,199	8.50%
Average:		$26,466	$22,878	

Inflation adjustment factor was based on the average inflation rate for the last forty years of 3.71% extrapolated out to a 40 year retirement horizon.

Table 13

Results for Housing Assets Valuation

Race	Home Ownership	Median Home Value	Home Value	Equity	Home Asset
Asian	0.723	$180,000	$130,140	0.9	$117,126
Hispanic	0.445	$143,000	$63,635	0.9	$57,272
Black	0.421	$143,000	$60,203	0.9	$54,183
White	0.723	$180,000	$130,140	0.9	$117,126

Table 14

Total Wealth Including Nest Egg and Home Equity

Race	**Marriage Rate**	**Wealth** (Inflation Adjusted)	**Wealth w/home**	**Government Figures**
Asian	0.76	$35,525	$152,651	$142,358
Hispanic	0.71	$13,445	$70,717	$68,287
Black	0.59	$13,166	$67,348	$34,160
White	0.73	$43,727	$160,853	$167,584

Salary Expectations and Salary Realities: An Analysis of University Students in Spain and Singapore

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One of the main reasons for attending an institution of higher education is to gain the requisite knowledge and skills to obtain employment and begin their career. While there has been abundant research on post collegiate employment in the USA, the researchers sought to investigate perceptions and trends in other countries. The selection of countries is a critical factor in gaining understanding and perspective. Consequently, the researchers chose two disparate countries which have seemingly nothing in common. The two countries differed in size, population, GPD and most importantly, their unemployment rate. The first is Singapore which is a very small country with @ 6 million inhabitants, however it has a low 2% unemployment rate and is ranked 6th in the world in terms of GDP which is estimated to be @ $85,300. Conversely, the second country is Spain which has a population of 48 million but has high unemployment as their rate 23%. Further, Spain's GPD is ranked 94th at @ $34,800.

The selection process students use to choose where to work is comprised of many factors. While each of these has their own advantages and disadvantages, the question arises as how much each of these is valued by prospective employees. Items such as job security, benefits, advancement, autonomy, responsibility, can mean as much as pay. How students preparing to enter the work force rank these factors can provide insights into what the students' value and provide employers with assistance in determining what incentives to offer.

However, for many the level of pay is paramount? The researchers sought to find if the amount of starting pay varied by the sector where the student sought employment? In addition, the researchers sought to ascertain if a disparity between what a prospective new employee perceives they will earn versus the amount of money they feel they will actually settle on earning.

The following research hypotheses guided the study.

H1: There is no difference in where students from Singapore and Spain would like to find employment (Private Industry, Public Service, or Starting their own or take over a family business)

H1a: There is no difference where students would like to find employment on the basis of Gender, Personality Type, and Major

H2: There is no difference in the job selection factors favored by students from Singapore and Spain.

H2a: There is no difference in the job selection factors favored by students from Singapore and Spain on the basis of Gender, Personality Type, and Major

H3: There is no difference in the amount of money (in percent) that students from Singapore and Spain hope to earn and the amount they will reasonably accept

H3a: There is no difference in the amount of money (in percent) that students from Singapore and Spain hope to earn and the amount they will reasonably accept on the basis of Gender, Personality Type and Major

A total of 460 usable responses from students from the two countries were obtained. The data was entered into SPSS and analyzed by country, gender, major, and personality type. Statistically significant differences emerged and implications for students and employers will be discussed. The remainder of the paper will focus on answering the research questions with statistical analysis and conclusions for practice.

Short-term Travel to China: Planning and Pitfalls

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Chris McCart, Roanoke College

Almost all college campuses across the country now have international education offices to assist students from other countries, while also promoting study abroad and short-term travel courses. The primary premise is that exposing students to other cultures will improve their critical thinking and decision making skills while ultimately improving their intercultural competence. As boundaries between countries blur for business and trade, improving these skills is important for students to be successful in a global economy. The purpose of this paper is to describe the process involved in creating and implementing a short-term travel course to China. In addition, a planned survey of participants will be described.

At the authors' college, we have a program called May term or Intensive Learning term. All students are required to take at least one of these courses to meet graduation requirements and all tenure-track faculty are required to teach a May term every third year. The objectives of the program "are to foster intense and purposeful faculty-student interchange and to encourage thoughtful, creative exploration of a focused topic during a time when students are enrolled in one and only one course" (Authors College Catalog). All intensive learning courses must emphasize active student participation, which the college monitors through the rigorous review of course syllabi. A result of the restriction to teach experientially along with the requirement that students not take any other course concurrently has led to a large number of travel courses being offered. Since one of our college's principles is to produce in our students "an understanding of community appropriate to American diversity and to the increasingly global experience of the 21st century", (Authors' College Catalog) an overwhelming majority of the May term courses require travel abroad.

China was selected for the trip that will be described for 2 primary reasons. First the importance of China in the global economy and the shift and/or expansion of many businesses to the Chinese market seems like an area worthy of deliberate study for college students. Also the Advisory Board for the Business Administration program at the Authors' College suggested the development of a course to China in order to offer students a firsthand glimpse at the world's new super power. The authors chose to partner in planning and teaching the class to help spread the workload and to provide more adult supervision in an international environment. The college's guidelines required a minimum of 10 students per instructor in order for both to fulfill the teaching credit unit (TCU) requirements.

In designing our course, the college's academic guidelines were followed, which require all new course proposals to be reviewed by the Curriculum Committee. A detailed syllabus and itinerary are reviewed by the committee to ascertain that all academic standards are met. In addition, there are numerous college procedures and rules about who is allowed to go on the trip, what information is required from all students, who holds passports, medical information, etc. Throughout the year prior to our course, monthly meetings were conducted by the Associate Dean in Academic Affairs responsible for May Term courses and the Director of International Education for all faculty offering a travel course. Meeting topics included recruitment and enrollment, safety, Cleary Act, Title IX, procedures to handle money and insurance coverage issues. These meeting were very important to minimize the college's liability and to help ensure that the students would receive needed assistance in a timely manner for any unforeseen

circumstance. For example, establishing procedures for access to important information, such as, medical forms and passports while out of the country was discussed and planned for. Also providing students with insurance cards in the event of an emergency was another precautionary measure. In addition, two course specific pre-departure meeting were held in the semester before our course to discuss logistical issues, like, recommended immunizations, passports and VISAs. Also important information about banking and cell phone use were reviewed in an attempt to prevent problems in China. Another important issue was organizing transportation to the airport for a very early flight, since all students departed from the same airport closest to our campus.

From an academic perspective, the course covered a 15-day period starting with a pre-departure meeting on our campus in the U.S. The course syllabus is shown in Appendix 1, which includes a detailed breakdown of the grading components: journals, topic papers, class participation/citizenship and the Intercultural Development Inventory (IDI) each of which will be discussed in more detail throughout the paper. Students readings included articles posted on the college course management system and a DVD Series entitled *On the Frontlines: Doing Business in China (*Fallows, Chang & Noera, 2009). The pre-departure meeting, which ran from 9:00 to 3:00 was our first academic session with the students. In the morning the students learned more about the IDI through activities led by the Director of International Education. Students worked through lunch to develop a presentation based on research of an assigned topic. Topics were selected based on background information the instructors felt was important to develop a basic understanding of China, as well as, industries that would be visited. Topics included: collective versus individualist society, overview of Buddhism, Chinese Economy, Sustainability in China, and focus on certain industries visited during the trip. Please refer to Appendix 2 for a more detailed description of each topic. Since access to the internet is unreliable and sometimes limited in China, we felt it was important for students to accomplish the most in-depth research prior to leaving the U.S. In addition, this saved on the cost of renting space to meet with students.

As noted on the syllabus 25% of the course grade related to the IDI, which is a cross-culturally valid and reliable assessment of intercultural competence. The “degree to which cultural differences and commonalities in values, expectations, beliefs, and practices are effectively bridged, an inclusive learning environment is achieved and specific differences that exists are addressed from a mutual adaptation perspective” is the meaning of intercultural competence (Intercultural Development Inventory Education). Students completed the IDI prior to departure and reviewed their results in individual meetings with the Director of International Education. In addition, our group profile was reviewed the day before we departed for China. At the end of the trip students completed the IDI a second time upon their return to the U.S. to assess whether they had progressed along the intercultural development continuum. The continuum ranges from denial, polarization, minimization, acceptance, to adaptation. Individuals further along the continuum have a more “intercultural mindset with a greater capability for responding effectively to cultural differences and recognizing and building upon true commonalities” (Intercultural Development Inventory Education).

In reflecting on the trip, the assumption was that travel abroad is beneficial for students. When attempting to evaluate our course in relation to the literature for the elements of effective short-term study abroad courses limited research was found. We did however find an article by Janet Hulstrand (2006), entitled "Education Abroad on the Fast Track" and used her "Key Elements to Create and Maintain Successful, High-quality Short-term Education Abroad Programs" as a framework to discuss our course. Below are the key elements along with an explanation of our approach:

- "Unassailable Academic Integrity". All assignments were developed so that it was not really possible for students to violate academic integrity. Personal journals about experiences could not be plagiarized without being blatant. Other assignments were about personal growth and development with grading based on completing the assignment; since there was no right or wrong answer. In addition, a large percentage of the grade was based on class participation and citizenship. Please refer to the grading rubric for these components of the course grade embedded in the syllabus in Appendix 1.

- "Integration into the Curriculum". Our course counted as an elective in the Business major or as a General Education May term course, which is required of all students to meet graduation requirements. True integration into the business curriculum would have drastically limited the number of students that could qualify for the course thereby minimizing demand. Also we needed 20 students for our course to be financially viable and provide each of us with a TCU. However if all students had similar background knowledge perhaps this would have changed the focus of the course, nonetheless based on the size of our institution and the previous requirements discussed the course was not fully integrated into a particular academic program.

- "Affordable Program Design". Overseas travel courses taught during our May term typically cost between $4,000 and $5,000. It is competitive to get students so one must be very careful to plan a good trip but to do it on a budget. To put this in perspective, generally fourteen May Term travel courses are offered annually for a student body of approximately 2,100 students. We developed a plan that for twenty students would cost $4,600 each. This included all travel, most meals, all tickets to required activities, and Chinese VISAs. Our initial budget worked well but we lost four students between the date of the initial deposit (December 1) and full payment (February 5). With four fewer students, the cost per student increased more than we had planned. We spent an inordinate amount of time during the spring semester looking for donations and cutting costs to eventually work out a viable plan.

- "Faculty buy-in and participation". We bought in 100%. The idea was initially suggested to develop a travel course to China by a board member in a planning meeting for the Advisory Board of the Business Administration program. The logic was that China is such an important part of the world economy that students should be exposed as much as possible. Our lives for two years revolved around this course to China.

Furthermore, we have a native Chinese History professor who constantly seeks to expose students to China and she was thrilled that the largest department on campus was choosing to develop a travel course to China. She readily agreed to help and come as our assistant, which added not only buy-in but a lot of expertise that would have been unavailable otherwise.

- "Interaction with the Host Community". We worked with an Academic Program Development company, CET Academic Programs, which worked with us to develop the best itinerary to meet our needs. CET has a full program at Donghua University (DU) in Shanghai where we stayed for the majority of our trip. We stayed in their guest house (nice dorms) and our students were paired with Chinese students in attendance at DU. The ability to interact with Chinese students their own age in a comfortable environment was extremely well-received and our students even shared that they would have enjoyed more time with their Chinese friends. We required directed journal assignments related to these interactions, which provided our students with some direction should they find communication difficult.

- "Incorporation of local language". It is impossible for most people to learn Chinese in two weeks and our students were no different. During their time at DU they had four language classes. These were helpful for basics but our students returned home far from fluent (other than the three who had taken Chinese previously). it should be noted that most businesses do not have an English speaking employee, this included hotels, restaurants, cabs, etc. This is a real challenge that travelers should be prepared for when visiting China.

- "Opportunities for cultural enrichment, and a faculty leader trained to provide on-site interpretation and support". Our course was quite structured with trips to either cultural sites or business sites daily. While in Shanghai, for day trips we always had a Chinese member of the CET staff with us for interpretation and support. We also had our own Chinese speaking faculty member. The last few days of the trip were spent in Beijing, which was coordinated through a travel agent we had found while planning our prep trip rather than by the CET staff. Our Beijing guide was excellent. His English wasn't perfect but his knowledge of the Beijing sites and his rapport with the students made him an effective teacher. The availability of this support was very important since most businesses do not have an English speaking employee, this included hotels, restaurants, cabs, etc.

- "A safe and secure environment". We lectured our students at every opportunity before leaving the U.S. about appropriate behavior and how to avoid trouble. We emphasized the government structure in China is very different from the U.S. and as visitors we really have no clout with the Chinese government. Behavior, entitled citizenship in the syllabus, composed a major part of the grade for added motivation. CET staff also gave basically the same lecture (both before they left the US and when they arrived in

Shanghai). This message was reinforced yet again from our guide in Beijing. For the most part they listened, i.e., they travelled together and rarely participated in activities that could get them in trouble. All hotels and dorms where we stayed were secure and in seemingly safe parts of town.

- "Competent, experienced staff". We relied heavily on the staff of CET and they performed admirably. This is crucial because we found China to not be extremely tourist friendly. For example, of the four hotels we stayed at during our trip only one location had English speaking employees at the front-desk. Several of the students encountered problems in certain restaurants even being allowed to enter.

- "Delivering what you promise (meeting student expectations)". Our syllabus was very clear of what we would be doing and learning each day, so there were no surprises. One student evaluation suggested that he/she expected to learn more Chinese language - it was only one though and we believe that the one person must not have been listening in our pre-departure meetings because this had been addressed.

- "Opportunities for Guided Reflection". Journals were assigned throughout our trip. The first two assignments were directed toward inner-cultural understanding and the last one was designed to select one activity or site visit to describe, examine interconnections, and finally articulate how it affected what was learned throughout the course. Please refer to Appendix 3 for examples of selected journal assignments and the grading rubric.

- "Balance in Activities". While planning the trip we thought about how many hours a day a given excursion/site visit would take and when the students would have free time. We also worked to balance visits to businesses with visits to cultural events/sites. In addition, we were very aware of the 12-hour time difference between China and the U.S. and intentionally scheduled the more difficult assignments later in the trip once students had acclimated to the new time zone. Finally, we were flexible and based on the energy level and feedback from students we did slightly adjust our schedule while traveling. We think the students appreciated our willingness to be flexible.

- "Maintenance of a strong, healthy group dynamic". Using activities and assignments early on, we worked to help students get to know everyone in the group, with the ultimate goal of developing respect and rapport with each other. Unfortunately, we had a few that thought they were superior to the rest. It was a small portion though and the rest did a good job of letting slights not bother them and probably bonded more among themselves because of the few difficult ones.

- "Opportunities for debriefing, reflection, reintegration upon return to the campus". Due to timing of the May Term course leading into summer break upon completion and housing considerations, we did not require students to return to campus after the trip. We did however require a final reflection paper due a week after we returned home. This

was intended to give them time to think and reflect. In a perfect world, we would have required them to spend some time on campus with us after the fact for thought and reflection, but this would have burdened our budget tremendously. The jet lag coming back from China also wreaked havoc with most of our systems so allowing time for us to get through that would have been nearly impossible.

Student Demographics

We were fortunate to have a diverse group of students in our course. Our final enrollment ended up at 14 students. Key student demographic information included:

- Males vs. Females: 6 males, 8 females
- Race: 12 White, 2 Black
- Year in School: 7 rising seniors, 7 rising juniors
- Major: 6 business majors, 2 communications majors, 1 computer science major, 1, creative writing major, 1 international relations major, 1 political science major, 1 psychology major, and 1 sociology major

One student had traveled to China previously during high school. Several students were well-traveled and have semester's abroad scheduled for the current academic year.

Next Steps

Student outcomes on the IDI were quite discouraging. Only three students progressed along the continuum while seven actually regressed. We attribute these results to the manner in which the IDI was presented to them. It was clear that the students thought the whole thing was a joke, particularly one very vocal student who scored at the very bottom and told students that he had been labeled culturally incompetent by someone who knows nothing about him and had only met him for one half hour meeting. Others experienced difficulties when dealing with the individual in charge of the IDI and thus thought anything she did could not be of value to them. Due to this debacle, we plan to try another approach to see if students will be more forthcoming with us and give us an indication of the course's value. As a result, we plan to survey students this semester to gauge the students' perceptions of the value of the course. A survey developed by Finley, Taylor and Warren (2007) will be used which includes seventeen statements about the value of the course on their educational experience and three statements about the value the international travel course added to their experience with classmates.

The seventeen educational value scale statements include:

- Sophisticated Global Mindset: The experience laid a foundation for the development of a sophisticated global mindset in a manager.
- Broad Global Issues: The experience changed my attitudes about broad global issues.
- Critically Think: The experience helped me to think critically about broad global issues.

- Cultural Complexities: The experience allowed me to discover the complexities of dealing with a culture which may be at times, very different from my own.
- Cultivating Global Clients: The experience increased my willingness to cultivate foreign clients or competitors.
- Understanding Global Clients: The experience increased my willingness to understand foreign clients or competitors.
- Analyze Cultural Differences: The experience improved my ability to analyze cultural differences systematically.
- Economic and Political Interactions: The experience enhanced my understanding of the interactions between changes in economic and political systems and pre-existing culture.
- Big Questions Exposed: The experience exposed me to "big" questions related to global issues.
- Motivation for Globalizing: The experience improved my understanding of motives for and degrees of global participation by a wide variety of organizations.
- Multi-Disciplinary Integration: The experience helped to integrate multiple disciplinary constructs.
- Macroeconomic Influences: The experience improved my understanding of macroeconomic influences.
- Improved Decision-Making Skills: The experience enhanced my decision-making skills.
- Economic Environments Addressed: The experience addressed macro-level, industry-level, and firm-level environments.
- Appreciation of Strategic Mentalities: The experience enhanced my appreciation of different strategic mentalities employed by organizations in the international context.
- Comprehend Global Implications: The experience helped me to comprehend the reasons things happen and their implications for conducting business domestically and internationally.
- Global Understanding: The experience helped me to move from global awareness to understanding.

In addition, three questions to assess students' perceptions concerning the value the international travel course impacted their experiences with other students in the class are as follows:

- Shared Memories: I benefited from the creation of shared group memories.
- Same Experiences Differently: I benefited from recognizing that fellow students understand the same experiences differently.
- Enhanced Student Interactions: The experience enhanced my interactions with other students.

We will present survey results at the Southeast DSI conference in February of 2017. With the small number of students in our class, this limits the ability to make generalizations to the larger college student population based on conclusions. However, we feel there is still value in further studying students' perceptions that can be helpful in planning future classes.

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APPENDIX 1

DOING BUSINESS IN CHINA SYLLABUS

INQ 277 – MAY 2016

[redacted] **Office: West 214** [redacted] **Office: West 218**

[redacted]**Phone:540-375-2501** [redacted] **Phone: 540-375-2414**

Course Objective: The objective of this course is to provide an overview of the magnitude and diversity of China's economy, including an understanding of cultural differences and how they affect behavior and doing business in China. By the end of this course students are expected to be able to understand the cultural underpinnings of business etiquette in China.

Course Description: How do cultural differences between China and the U.S. result in different business practices? Through travel to different businesses in China, students will learn how business is conducted in various types of organizations; students will also have the opportunity to meet with Chinese students in an informal social setting to discuss differences in business practices. Our travels in China will take us to different types of business: examples include: Chinese and American car factories, an organic farm, retail/concession areas, and a tea plantation. The course will include guest lectures by Chinese Business people on China's Economy and International Scrap Business. The course will end with a visit to the Great Wall in Beijing.

Prerequisites: none

Course Readings/Videos:

Stoller, Gary, *Expert Etiquette Tips for Doing Business in China*, USA Today, 12/30/13.

Witt, Michael A., *The Ten Principles for Doing Business in China*, Forbes, 12/3/06.

On the Frontlines: Doing Business in China, James Fallows, et. al., 2009.

There are other short articles posted on Inquire that are optional reading.

Other required materials:

- Laptop or 2 Bound Journal
  - If you opt to use a laptop you will need 1 flash drive labeled with your name
- Notebook

Intended Learning Outcomes:

Students will be able to:

- Understand (articulate) the magnitude of the Chinese economy and what this means for the US.
    - Business in China today:
        - Learn about the Chinese financial markets
        - Learn about the textile industry in China
        - Learn about the tea industry in China
        - Learn about car manufacturing industry in China.
        - Learn what China is doing to make their food source safer
        - Learn about the tourism industry in China
- Understand cultural differences that result in very different acceptable business behavior
    - Explore some of these cultural differences through dialogue with Chinese Students
    - Explore the correlations between Chinese cultural values and accepted business practices
- Etiquette
    - Learn/experience the etiquette required to succeed in doing business in China
    - Critically reflect on personal behavior and understand what changes would be necessary to be successful conducting business with Chinese companies

Attendance. Attendance is crucial to your success in the course and is expected. Attendance is mandatory, since there is significant daily activity requirements. Failure to attend class sessions noted below can have significant ramifications on your final grade. A class is defined as any time we meet as a group for lecture, touring, or discussion.

There are serious repercussions for lack of attendance. As follows:

Unexcused classes / activities	Point adjustment to final grade
1	0
2	-10
3	Dropped from the class - DF

After the second unexcused absence, a student will be given a written warning (and the registrar and International education office copied) notifying him/her that one more absence will result in a DF and being sent home at the student's expense.

Journal Reflections: Students will maintain a journal while traveling. Journal assignments will include a mix of directed and free choice responses that require students to reflect on their experiences, what was learned, and how concepts could be applied. Several journal assignments will require a response to a directed issue or theme relevant to a site visit or activity. Journals will be collected periodically for grading and feedback. Journals may be completed electronically or on paper in a bound notebook/journal (no loose papers please).

Topic Research/Presentations: In groups, students will research and present at least 1 time on assigned topics during the course.

Citizenship and Class Participation is extremely important in this course and is heavily weighted at 30% of the overall grade. Students will be held accountable for practicing the highest levels of moral and ethical standards during this course by showing respect at all times for people, places, and things encountered during this course. *Please turn off cell phones prior to entering facilities for site visits.* Class participation includes active listening and constructive discussion, focused brainstorming, and debate.

Grading is as follows:

A	Student participates every day unless unable to because of injury or illness - gives much effort - takes responsibility for own learning - is positive. Works well with others – doesn't complain – follows rules – is on time and prepared – acts responsibly.
B	*With one or two minor exceptions*, student participates every day unless unable to because of injury or illness - gives much effort - takes responsibility for own learning - is positive. Works well with others – doesn't complain – follows rules – is on time and prepared – acts responsibly.
C	With one or two minor exceptions, student participates every day unless unable to because of injury or illness - *gives average effort - attitude may be wanting*. Works well with others – doesn't complain – follows rules – is on time and prepared – acts responsibly.
D	Student behavior *contributes negatively to the learning / activity environment - gives low effort - has poor attitude - inconsistent in meeting requirements for participation – late for activities and/or classes.*
F	Student's *behavior is completely inappropriate*

Intercultural Development Inventory is a cross-culturally valid and reliable assessment of intercultural competence. Group and individual profiles will be available based on our classes results and will help us reflect on our experiences around cultural differences and similarities. A goal of this course is to increase our cultural self-awareness and hopefully progress along the continuum. Due to the importance of all class members completing the IDI prior to departure, and again upon return, as well as, developing an understanding of their IDI results 25% of the course grade is allocated to this assessment.

The grading breakdown is as follows:

5% pre-departure IDI (you have all done this. YEAH!)

5% individual meetings with Dr. Serota – Cote

15% Completion of IDI a second time upon return to U.S.

Remember there are not "right or wrong" answers to this assessment.

Grading Weights		**Grading Scale**	
		93-100	= A
Journal Reflections	30%	90-92	= A-
Topic Presentations	15%	88-89	= B+
Class Participation/Citizenship	30%	83-87	= B
IDI	25%	80-82	= B-
		78-79	= C+
Total	100%	71-77	= C
		70-72	= C-
		68-69	= D+
		63-67	= D
		60-62	= D-
		Below 60	= F

Academic integrity Roanoke College's Academic Integrity Policy will be enforced in this class. Since a large percentage of the class grade is based on participation, you are encouraged to interact with other students in the class. Therefore, you may work together on all assignments unless otherwise stated. Journal reflections should be your own work, however you are certainly welcome and will often be asked to discuss theses entries with your classmates. If at any time you have questions, feel free to ask.

DATE				Activity
11-May	Wed		**9:00 am to 11:00**	Pamela Serota discussing IDI
			11:00 -11:30	Syllabus and Assignments
			11:30 - 3:00	Topic Research and Presentations
12-May	Thur		**6:00 a.m. depart**	Fly out of US
13-May	Fri	**Day 1**	**1:55 p.m.**	Arrive in Shanghai, Airport pick-up
				Welcome dinner
14-May	Sat	**Day 2**	**8AM**	Meet in Hanting Lobby to have breakfast in school cafeteria
			8:10-8:35AM	Breakfast on your own
			8:45-10:45AM	Orientation
			11AM	Check out Hanting and check in Xitianyou
			12AM	Group Lunch in Campus cafeteria (CET payment)
			1-3PM	**Chinese Class1&2**
			3-5PM	Tour of University with Roommates
			6PM	Dinner on your own
15-May	Sun	**Day 3**	**8:30-9AM**	Breakfast on your own
			9-10:30AM	**Class/movie1 by Roanoke**
			11AM	Transport to the French Concessions for lunch
			NOON	Lunch on your own
			1-3PM	Guided walking tour in the Former French Concession
			3-5PM	Tour the Urban Planning Museum
			5-6PM	Back to campus by bus
			6PM	Dinner on your own
16-May	Mon	**Day 4**	**8AM**	Breakfast on your own
			8:30-10:00AM	**class/movie2 by Roanoke**
			10:00-11:00AM	**Chinese class3 with Xu laoshi**
			12AM	Group Lunch in Campus cafeteria (CET payment)
			1:30-3PM	Transport to VolksWagen
			3-5PM	Visit VolksWagen
			5PM	Group Untour Shanghai - Night Street Food Tour
			7PM	Back to campus by metro
17-May	Tue	**Day 5**	**8AM**	Breakfast on your own
			8:30-10:00AM	**class/movie2 by Roanoke**
			10:00-11:00AM	**Chinese class4**
			11:30AM	Group lunch
				Free afternoon
			6PM	Dinner on your own
			7PM	Evening Speaker - Graham Earnshaw

DATE				Activity
				"Textiles and Fashion" day
18-May	Wed	**Day 6**	**TBD**	Breakfast in cafeteria
			9 to 10:30	Roanoke class
			lunch	cafeteria
			12:15	depart for garment factory
			1:30 to 3:00	visit factory
			3:30 to 4:30	visit the studio owned by the former DHU roommate
			4:30	Visit shop of the brand founded by former roommate
			TBD	back to campus
			TBD	Dinner on your own
				A "Pudong Day"
19-May	Thur	**Day 7**	**8AM**	Breakfst on your own
			9:30-11AM	Professor Joe Yuan speaks on Chinese Economy, joins group for afternoon and evening
			11-12AM	Lunch on your own in campus cafeteria
			12-1PM	Metro to Pudong Financial District
			1-4PM	Afternoon Tour Pudong Financial District with visit to top a building
			4-5PM	Sundown cruise on the Bund
			5PM	Dinner on your own
			6PM	Metro back to campus
20-May	Fri	**Day 8**	**8AM**	Breakfst on your own
			8:30-9:30AM	Travel by Bus to Car Factory
			9:30-11:30AM	Electric Car Factory Tour
			12AM	Group Lunch with Farmers
			1-4PM	Organic Farm and Homes
			4-5PM	Back to Campus
			5:30-6PM	Dinner on your own
21-May	Sat	**Day 9**	**5:30AM**	Breakfast on your own
			6AM	Metro to railway station
			7:28-8:36AM	Fast train to Hangzhou
			8:36-9:30AM	Bus to Lingyin Temple
			9:30-12AM	Buddhist Temple
			12-1:30PM	Group Lunch
			1:30-2PM	Bus back to West Lake
			2-2:30PM	Check in hotel
			2 ： 30PM	Tour West Lake with Boat Ride (if time permits)
			5PM	Free evening on West Lake
22-May	Sun	**Day 10**	**8:30-9AM**	Breakfast on your own, check out of hotel
			9:45-11:30AM	Bus to tea field, tea field hike
			11:30AM	Group Lunch in tea fields
			3:53-4:59PM	Train back to Shanghai, metro back to campus
			5PM	Metro to campus
			6PM	Group Closing Banquet
23-May	Mon	**Day 11**	**TBD**	Check out of rooms
				Metro to train station
				Fast Train to Beijing - arrive at 6:48
				Peking Duck Dinner
				Check into hotel - Grand Mercure Beijing Central Hotel

DATE				Activity
23-May	Mon	**Day 11**	**TBD**	Check out of rooms
				Metro to train station
				Fast Train to Beijing - arrive at 6:48
				Peking Duck Dinner
				Check into hotel - Grand Mercure Beijing Central Hotel
24-May	Tues	**Day 12**	**TBD**	Full day city tour to:
				Tian' an men Square
				Forbidden City
				lunch at local restaurant
				afternoon visit the Silk Market
				Evening Dinner and Acrobat Show
25-May	Wed	**Day 13**	**TBD**	Visit Jade Factory
				visit Great Wall (Badaling section)
				lunch at Great Wall
				summer Palace including dragon boar ride
				dinner at local restaurant
26-May	Thurs	**Day 14**	**TBD**	Check out and be ready at 12:30 to head to airport for 4:10 flight home

Appendix 2
Doing Business in China – May Term
Topic Research and Presentations

General Guidelines

- Presentations should be completed in PowerPoint
- Presentations should be 10 minutes or less in length
- Proofread and spellcheck your file
- Avoid wordy slides
- Use pictures as appropriate
- Submit your file to Inquire through link provided.

Topic 1

- Collective vs. individualist society
  - Define each term (the "Cultural Difference Continua" might be a start)
  - Explain how these differences result in different behaviors
  - The effect that these different behaviors may cause – give examples using China vs. the US.

Topic 2

- Overview of Buddhism (religion and temples)
  - Brief history
  - Prevalence in China
  - Basic beliefs

Topic 3

- Overview of Chinese economy
  - Top industries in China (textiles, vs. banking. Vs. auto manufacture, etc.)
  - per capita income, GDP, unemployment, population size (growth trends in these)
    - growth of middle class,
  - anything else of interest and relevance

Topic 4

- Sustainability in china
  - Pollution – how bad is it?
  - Organic farms (we will visit one)
  - Wind energy (and other forms of green energy)
  - Scrap industry

Topic 5

- Focus on Industries we will Visit during trip
  - Manufacturing/agriculture/financial services today in China (emphasis on auto, fabric/fashion, farming, tea, banking
  - Size of individual industries
  - Typical company size
  - Company ownership (who owns the company?)

Appendix 3

Grading Rubric for Reflective Journal Entries

You will earn **6 points for turning in your journal on time**, **2 if it is late, and 0 if not turned in**. Otherwise, the journals will be scored according to the categories and definitions below for a **maximum total of 20 points.**

Category	**Point Values** 4	1-2	0
Content	Entry contains complete answers to ALL questions prompts	Entry provides answers to most question prompts but may miss 1 or 2	Entry significantly misses key question prompts or does not answer important questions
Fluency	Entry manifests good grammar, sentence structure, and spelling If handwritten the journal entry is legible/easy to read.	Entry has no more than 2-3 simple or basic grammatical errors If handwritten, one must struggle to decipher 2 or more words or phrases.	Entry contains one or more sentence fragments, run-on sentences, or serious grammatical problems If handwritten, illegible/can't read the entry.
	6	3-4	0
Quality and Mastery of content	Answers reflect honest, thoughtful responses As appropriate responses are linked to the student's own life and experiences AND go beyond just answering the questions by connecting the student's experiences to the course	Answers are vague, but appear to be sincere attempts to answer the questions; they demonstrate some understanding of course material, but the journal does not clearly connect the student's experiences to the course.	Answers are superficial and do not reflect thoughtful consideration or reflect important aspects of the student's experiences or are irrelevant to the issues/questions posed in the journal

	Date			
Journal Assignment	**Assigned**	**Due**	**Location**	**Description**
1	6-May	12-May	Chicago Airport	Reading Prompt Chinese Business Etiquette articles
2	6-May	14-May	Orientation Meeting	IDI Assessment Activity
3	11-May	15-May	Class Meeting	Take-away from May 11th Topic Presentations
4	16-May	17-May	Class Meeting	Reflection on VW Plant and Street Food Tour
5	17-May	18-May	Class Meeting	Reflection on "Free Afternoon"
6	20-May	21-May	Train Station	Reflection on Electric Car Factory/Organic Farms
7	21-May	22-May	Lobby of Hotel at Checkout	Reflection on Tea Fields/West Lake
8	26-May	30-May	Submit thru Inquire	Summary Reflection on Trip

Running Head: SOCIAL MEDIA AND XENOCENTRISM

Social Media Advertising: Xenophobia and Implications on Interpersonal Closeness with Foreigners

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2016

Abstract

Companies are heavily relying on social media to promote their products. In a globalized world, advertisements are expected to include multiple ethnic groups and races, however this is still not a reality; some social media advertising campaigns portray foreigners under stereotypes, enhancing ethnocentrism and consequent xenophobia. This research investigates the impact of social media xenophobic advertisements on Interpersonal Closeness (IC) with foreigners while proposing ethnic inclusion in advertisements as a trigger to Xenocentrism, the attraction toward foreign products.

Keywords: *social media, stereotypes, xenophobia, ethnocentrism, xenocentrism*

INTRODUCTION

Social media has transformed the way in which humans connect. In the last decade humanity witnessed the raising of Facebook, Instagram, and Twitter, which gave humans a different approach to self-exposure, and relationships that are now established virtually. Meanwhile, many companies are taking advantage of the immediate exposure given by social media, incorporating it as an essential part of the Integrated Marketing Communications (IMC) plan. Advertising campaigns that are launched on social media have the power to reach millions of consumers in just one minute, while a print ad requires a much longer time to reach the same amount of people.

In consequence, companies posting on social media are improving brand popularity, opening a direct communication channel with target markets. Social media advertisements are expected to reach thousands of consumers, amplifying their predisposition to buy a product, and strengthening brand loyalty. However, the impact of social media advertisements is not only centralized on its potential to change buying behavior: it also influences how people connect.

Human connections are made between similar people – those who are born in the same country, under the some race, values, and traditions – and can also be formed between contrasting individuals; when connecting to foreigners, people are challenging *Xenophobia*, which is defined as an "unreasoned fear of that which is perceived to be strange" (Boepple, 2014). Some people can be even attracted to "foreignness", perceiving the connection with aliens and the purchase of foreign products as trendier, a phenomenon called *Xenocentrism* (Balabanis & Diamantopoulos, 2016). Human connections also vary in perceived proximity, which is called interpersonal closeness (IC), or the degree in which a person perceive others as close, or distant (Dubois et al, 2016).

This research provides understanding about the relationship between social media advertisements and IC, proposing that advertisements portraying multiple ethnic groups are responsible for enhancing consumers' closeness with foreigners, while expanding xenocentrism. On the other hand, this research provides examples of xenophobic advertisements on social media, suggesting that those portraying foreigner stereotypes are accountable for reducing consumers' IC with foreigners, additionally reducing xenocentrism.

In order to investigate College students IC with foreigners, we conducted a questionnaire that measured respondents' perceived closeness to foreigner acquaintances. Our intended contribution is to provide a theoretical explanation for the need of ethnical inclusiveness in advertisements, which can be a tool against xenophobia in the creation of a more unified world, while supporting global market's expansion.

LITERATURE REVIEW

Xenocentrism: opposing Xenophobia and foreigner stereotypes

The term Xenophobia began to be used to explain the prejudice against foreigners, and the fact that people usually place higher trust on people who are similar to them – which includes race, nationality, and ethnicity. Since social media has been shaping human behavior, it is occasionally a conductor of xenophobic messages sent by advertisements.

Other researchers have proven that visual images have the power to instigate behavior, and that xenophobia can be either promoted or confronted by visual imagery (Jones, 2011). Xenophobia usually begins with some stereotypical impressions of foreigners. Stereotyping is the process in which humans categorize information, usually being mental shortcuts and an "over-simplified conception, opinion, and belief about a person or a group considered to typify that object" (Ibroscheva & Ramaprasad, 2007). Social media advertisements occasionally portray foreigners under stereotypes, as seen in Figures 1 to 4 in Appendix I. These stereotypical

advertisements enhance xenophobia and reduce people's propensity to develop connections with foreigners, while also decreasing consumers' willingness to purchase foreign products – a strategy to be avoided by multinational companies operating in a globalized market.

In the last years a new phenomenon emerged, challenging xenophobia: Xenocentrism. In this case, consumers demonstrate favorable attitudes towards foreign people and products, as a psychological process in which domestic products and compatriots are perceived as less trendy, and sometimes even less reliable/trustful. Xenocentric consumers prefer foreign products over domestic ones, and are usually from countries with low status, therefore being more frequently observed in emerging markets (Balabanis & Diamantopoulos, 2016).

Social media advertisements that include multiple ethnic groups while avoiding stereotypical representation of foreigners are more likely to enhance xenocentrism, constructing a market that is more open to foreign products, and people.

Interpersonal Closeness: the impact of foreigner stereotypes

Jones (1991) states that immigrants are subjects to generalizations reflecting the perception that they play different "occupational roles and social status". The author affirms that Hispanics are perceived as lazy, ignorant, and aggressive. A research conducted by Dong & Murrillo (2007) investigated the influence of television in negative stereotypes toward Hispanics, and concluded that television viewing and general media stereotypical portrayals are positively related to ethnic discrimination.

News media can also be a source of stereotypical exposure, influencing negative evaluations toward social groups. Studies conducted by Arendt & Northup (2015) revealed that long-term exposure to racial/ethnic stereotypical news portrayals generates negative implicit reactions in viewers. The leading video-sharing website Youtube is also known for the racist and ethnocentric content of some of its videos, and for this reason Guo & Harlow (2014) support

the idea that alternative media should be critical in content, requiring a need to be closely examined in the case of racist ideologies. The authors confirm that Latinos are usually portrayed by media as criminals, and job thieves; their research also found that an overwhelming majority of 85% popular Youtube videos sought to perpetuate some kind of ethnic/racial stereotype when portraying Latinos, Blacks, or Asians.

The role of media as a sponsor of xenophobia was addressed by Ibroscheva & Ramaprasad (2007): the authors affirm stereotypes are fundamental concepts in studying intercultural relations. The authors ratify that mass media can readjust human connections while encouraging people from dominant social groups over others. On the other hand, media can also contribute to enhance peoples' proximity with foreigners when refusing the use of stereotypes, and when embracing ethnic plurality as seen in Figures 5 and 6 of Appendix I.

Interpersonal closeness (IC) is formed by many features of social interaction, such as the depth of a conversation shared by two people, physical proximity, or intimacy. It is defined as "the perceived psychological proximity between two people", and it influences the extent in which people disclose personal information with others. Many are the factors influencing humans' propensity to connect; a strong perception of differences can decrease the propensity that two people have to develop a close relationship, therefore can be concluded that foreigner stereotypes portrayed on social media advertisements reduce IC with foreigners, being linked to xenophobia.

A Global Identity: Xenocentrism and High IC with Foreigners

Xenocentric consumers tend to purchase foreign products and make stronger connections with foreigners. They are responsible for boosting international trade, and are perceived to have a global identity.

A person with a global identity has higher identification with people around the world, believes globalization is a positive process, seeks information about global events, and recognizes similarities with foreigners, without placing focus on dissimilarities between people around the world (Bartsch et al, 2016).

Enhancing consumer's global identity is the key to markets' openness however it is challenged by the idea that people from other countries are different, or inferior. Thus, social media advertisements depicting foreigner stereotypes are highlighting global differences, without unifying consumers under a single global market.

Stereotypical media content impacts consumer behavior, and product purchase. Forehand & Deshpandé (2001) concluded that people demonstrate more favorable responses to advertising that targets their own ethnic group, featuring actors with similar-ethnicity. On the other hand, members of the non-targeted market respond less favorably to advertisements that do not include their ethnic group. Ouellet (2007) confirmed that ethnic animosity is a determinant of consumer purchase behavior, since xenophobic consumers have lower propensity to buy products that were produced by minorities, even when the purchase happens in the local (national) market.

Advertising was, meanwhile, considered by Puzakova et al. (2010) a relevant influence on changing consumers' acceptance of foreign products; the authors proposed that ethnically diverse media advertising of foreign products can reduce consumer ethnocentrism, breaking current barriers in the global marketplace.

It can be assured that non-stereotypical, ethnically broad advertisements reinforce Xenocentrism, making consumers more open to the international market. In addition, it has power to enhance interpersonal closeness (IC) between cross-cultural individuals.

Researchers have found that collective societies are more open to interpersonal closeness with foreigners that individualist ones (Uskul et al, 2004; Uleman et al, 2000). This phenomenon is due to the fact that people from individualist societies usually emphasize uniqueness, and their differences from others as methods of self-identification, while people from collective societies build identity through relationships, and connectedness (feeling of belonging).

Hence, advertisements portraying multiple ethnic groups will enhance a collective approach to others, decreasing individualism – which amplify people's propensity to develop high IC levels with foreigners.

DISCUSSION

In order to discuss advertisements impact on Xenocentrism and IC, this research investigates two cases of companies that have been successful exploring ethnic diversity in advertisements, as seen below:

Case 1: Benetton and a globalized brand identity

Benetton is an Italian fashion company that is hold as innovative in regards to its Marketing strategies. In 2016 Benetton launched a creative platform called "Clothes for Humans", in which all marketing material is carrier of a strong message against xenophobia: "We make clothes for humans that come in different colors, and different shapes. Humans that hold different beliefs, and live in different places" (Roderick, 2016).

According to Barela (2003), Benetton proves that there is a need for unique methods of advertising, essential to businesses wanting to compete in international markets as globalization continues. Benetton remained successful because it is a brand recognized as multinational, trendy, and responsible for creating advertisements for "people of the world".

When purchasing products that are manufactured abroad and advertised as ethnically plural, customers are strengthening their global identity and developing a tendency towards Xenocentrism. Meanwhile, these same customers presumably have a higher propensity to develop strong personal connections with foreigners, fighting Xenophobia.

Case 2: Coca Cola is for everyone

Coca-Cola is famous for its Super Bowl commercials; the brand improved its message strategy with the campaign "America is Beautiful", aired for the first time during the 2014 Big Game. The TV commercial was repeated during the opening ceremony of the 2016 Rio Olympics with the title "Together is Beautiful", and portrays many American families with different ethnicities, while an American patriotic song is sung by different people and in multiple languages (Coca-Cola website, 2016).

Coca-cola has been, for many decades, a brand that relies on the idea that people can be united by simple things, like a song…or a soft drink; its logo and colors are recognized by all, while it sells a product that can be bought all over the world; however the "America is Beautiful" campaign provided innovation since for the first time addressed the many ethnicities that compose the United States. Some viewers defined as "shocking" to listen to a patriotic song sung in different languages, as discussed by Poniewozik (2014). Nonetheless, Coca-Cola is one of the most global brands in the world, with the power to make people multi-cultural, and ethically tolerant.

CONCLUSION

Scales were developed by other researchers in order to measure Interpersonal closeness (IC). Popovic et al (2003) developed a scale entitled PICS, or *Perceived Interpersonal Closeness Scale*, which requires an individual to place others within a close (or distant) space from the self. In this type of scale, the perceived distance between the respondent and significant

others are easily mapped, afterwards being compared with the perceived distance between the respondent and acquaintances.

This research encourages future investigation of IC with foreigners using PICS, proposing an in-depth analysis of respondents' answers; at this point, no researches were found measuring people's IC with foreigners, which can be a subsequent contribution. We plan to conduct an Experiment that will measure people's propensity to establish close relationships with foreigners after being exposed to a set of ethnically inclusive advertisements, in order to confirm its positive influence on Xenocentric manifestations.

Global brands (such as Benetton and Coca-Cola) are already taking advantage of the development of Xenocentrism, while spreading an ideology of union between people that are diverse in race, and nationality. As researchers, we are sure that this is the path to be followed by all brands willing to explore the global market, especially on social media channels.

This research contributed to the current Marketing scenario while proposing a plural, and non-stereotypical representation of foreigners on social media advertisements, a strategy that enables people to connect with others, and with brands from all around the world.

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APPENDIX I

Figures

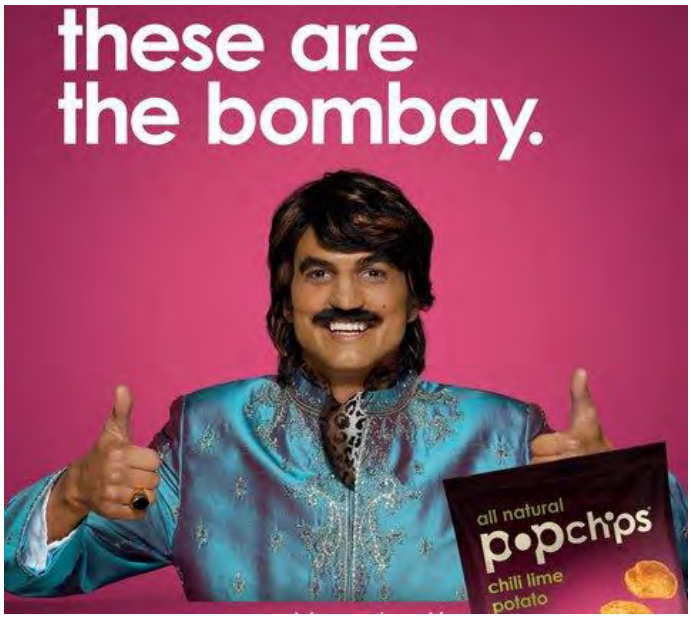


Figure1: Stereotypes of Indians / Chips advertisement

Figure 2: Stereotypes of Asians / Paper advertisement

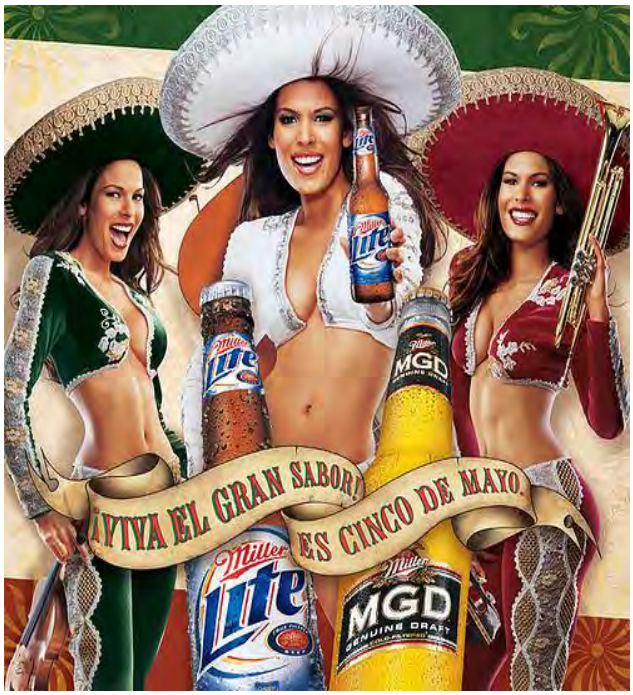


Figure 3: Hispanic Stereotype / Beer advertisement

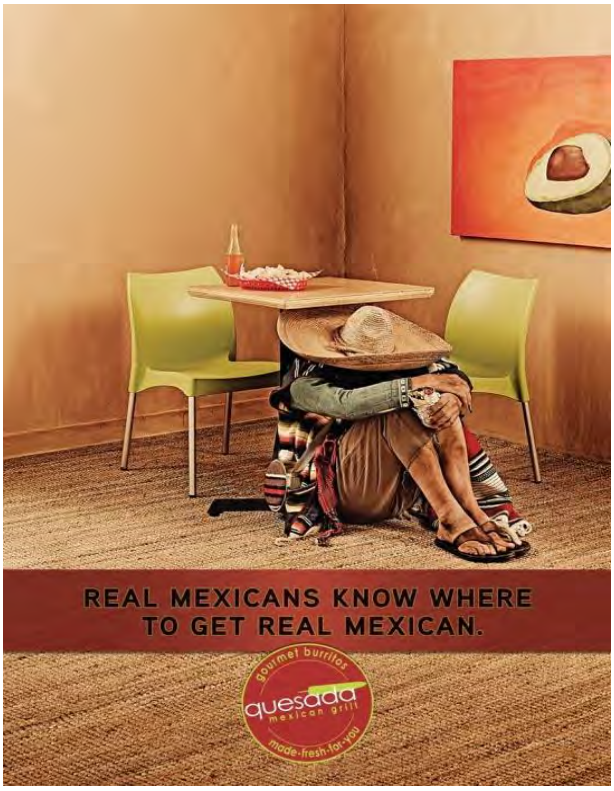


Figure 4: Mexican Stereotype / Tex-Mex food-chain advertisement

Figure 5: Challenging Muslim stereotype / Fashion brand advertisement

Figure 6: Challenging Ethnocentrism / Fashion brand advertisement

SOME DRIVE-THRU'S ARE 'MORE EQUAL THAN OTHERS'

By: Teresa Fábregas, Kevin Kelly & Martin Grenchik

ABSTRACT

In this paper we examine drive-thru performance in fast food restaurants. How do you know if a drive-thru is performing well? Quick Service Restaurants or QSR have accounted for flow time. However, is this the appropriate performance measure? When flow time is used, it's missing the goal of the drive-thru. While the drive-thru is meant to be quick, it's main purpose is to make money. When flow time is used, it does not account for inventory (cars waiting in line). Therefore, a more appropriate performance measure is flow rate; *how much money is a fast-food chain actually making?* Through this measure we are able to determine a fast-food chain's customer capacity by identifying the bottleneck.

Keywords: Fast food drive-thru, Bottlenecks, Throughput, Flowtime, Inventory, Little's Law

Introduction

Throughout the years supply chain measurements have increased in efficiency and precision. It is through these concepts that one can observe everyday operations and processes differently. The following discusses a nontraditional approach in which Quick Service Restaurants or QSR models can measure their drive-thru performance in order to maximize efficiency and ultimately, create a lasting profit. Drive-thrus currently generate 60-70% of profits in fast-food restaurants and its efficiency is crucial for returning customers and revenue (Oches, 2016). This paper will discuss the different drive-thru models leading fast-food chains have adopted as well as its shortcomings through a supply-chain perspective. Furthermore, this paper will discuss supply chain concepts in order to tie in the correct way QSRs should evaluate better perfomance analysis. Lastly, all of the following is discussed in order to accurately adjust to the ever changing innovations within the food and beverage industry. Such innovations can already be seen through "in app" cell-phone purchasing experiences that are meant to minimize wait time between consumers and their meal and many others. It is important to note that QSR findings are based off *QSR 2016 Drive-Through Performance Study* which is available to the public.

Typical Setups

There are three dominant for drive-thrus. The order of processes for each of these models are similar in that a customer orders, pays for and then receives their food. However, the main difference is in the number of stations that a given drive-thru operates.

The first we will discuss is the the simplest model for drive-thrus, the one station model. At a one station model, the customer orders, pays for and receives their food at one station (the same station) rather than multiple stations. This model is less popular than others, yet still achieves the goal of delivering the finished food to the customer. One popular establishment that offers the one station model is Brew Thru®, the one stop drive-thru where one can purchase alcoholic beverages. This model can be portrayed as the following:

The second most popular model for drive-thru is the two station model (Figure 2). It is the dominant model and accounts for 85.6% of all drive-thru's (Oches, 2016). For the two station model there are two possible options for how the processes can function. In option A, the customer ORDERS their food at the first station, then PAYS for and RECEIVES at the second station. In option B, the customer ORDERS and PAYS for their food at the first station and then RECEIVES their food at the second station. Option B is used more frequently than that of A. This two station model is dominant in fast food chains such as Wendy's, Taco Bell, Hardee's, Checkers and Burger King. Jack-In-The-Box, the first restaurant chain to use a drive-thru, still uses this two option model today. This two station model can be portrayed as the following:

Lastly, another popular choice is the three station model (Figure 3). In this model, each processes of the drive-thru is delegated to a particular station. At the first station the customer order their food, at the second station the customer pays for their food and at the third and final station, the customer receives their food. This model is particularly common in McDonald's drive-thrus as well as many Chick-Fil-A establishments. This third model can be portrayed as the following:

Performance Measures

In order to measure the efficiency of a drive-thru it is important to understand some basic concepts of supply chain management. The following concepts are basic measurement tools in order to accurately explain and calculate the time from which an activity starts until it ends. The first concept is *throughput*. Throughout is the volume of flow units going through the system per unit time. For example, one can utilize throughput to determine the number of customers a restaurant serves per hour. Throughout is an essential tool in our research for it helps us determine the appropriate amount of customers that frequent an establishment in any given unit of time. With throughput we are able to determine a more accurate representation of the average amount of customers using a drive-thru and consequently, the amount of

time they spend while doing so. Throughput is limited by the bottleneck, or the resource with the lowest processing capacity, because it is the activity that consumes the greatest amount of time. This is where our second concept ties in: *flowtime*. Flowtime is the time taken for one flow unit to go through a process from start to finish. For example, in the basis of our research, flowtime is the amount of time it takes for a customer to order, pay and receive its meal. Internally, a fast food company has already established standards of what this flowtime looks like for the meal preparation-- just like externally, fast food companies have an expectation of the appropriate flowtime customers perceive. In addition, inventory will also be a tool of measurement. Inventory is the volume of flow units in the system at any given time. For our research, we will be utilizing inventory to keep track of the amount of cars available at a drive-thru. An important part of understanding of how drive-thru's set up deals is through Little's Law. Little's Law states that inventory is equal to flow rate multiplied by flow time. By using algebra, it can be demonstrated that customers will spend greater time waiting in inventory if the drive-thru that do not focus on shortening bottleneck activities.

Methods

There are three main activities that take place at a fast food drive-thru; ordering, paying, and receiving. There are also three standard drive-thru set-ups that most fast food restaurants tend to use.

We can prove using simple algebra that set-ups with three stations are better than set-ups with only two or one stations in terms of throughput. Throughput is measured as $\frac{1}{\textit{processing time of bottleneck station}}$.

The overall capacity of a drive-thru is the capacity of the station that takes the greatest amount of time. Here are times for each activity can be represented by the following variables:

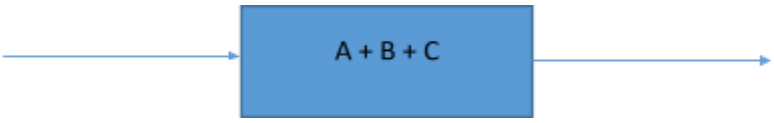
A=Ordering

B=Paying

C=Activity

With this model we are under the assumption that the time for each activity is greater than zero.

Our single station activity looks like this:



Here the throughput is $\frac{1}{A+B+C}$ because each activity is taking place at the same station. If we break up the activities into a two-station set up it would look like this:

This model is superior to the single-station model in terms of throughput, since throughput is dependent on the bottleneck station's capacity which is either $\frac{1}{A}$ or $\frac{1}{B+C}$. At either rate it is still known that the capacity $\frac{1}{A} > \frac{1}{A+B+C}$ We also know that $\frac{1}{B+C} > \frac{1}{A+B+C}$.

Because of this, the two-station model is always superior to the one-station model.

Finally, we have the three-station model in which each activity is broken into its own station.

In this situation, the capacity is dependent on the bottleneck station's capacity which is either $\frac{1}{A}$, $\frac{1}{B}$ or $\frac{1}{C}$.

In retrospect, when this is compared to the capacity of the single-station set up, it will always be superior because $\frac{1}{A} > \frac{1}{A+B+C}$, $\frac{1}{B} > \frac{1}{A+B+C}$, and $\frac{1}{C} > \frac{1}{A+B+C}$. When this is compared to the capacity of the two-station set up the three-station station set up is either superior, or at worst equal, depending on which activity is the bottleneck. If activity B or C is the bottleneck, then the three-station is superior because $\frac{1}{B} > \frac{1}{B+C}$ and $\frac{1}{C} > \frac{1}{B+C}$ If it is the case that activity A is the bottleneck then the capacity will be the same because $\frac{1}{A} = \frac{1}{A}$. In other words, at the worst that a three-station system can perform matches the best performance from a two-station system. At establishments that have greater volumes than customers, it is often preferable to utilize a three station system.

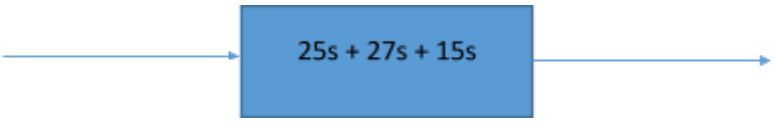
We can also prove this by example by assigning arbitrary times for each activity's length:

A = 25 seconds

B=27 seconds

C = 15 seconds

Our single station activity looks like this:



Here the throughput is $\frac{1}{67}$, that is to say that they have the capacity to serve one customer every 67 seconds. If we break up the activities into a two-station where the customer orders at one station and then pays for and receives their food at the same station the set up it looks like this:

Because the second station is our bottleneck in this situation, it controls how many customers may be served at a time which here is $\frac{1}{42}$, one customer every 42 seconds. The capacity to serve one customer every 42 seconds is of course superior to the single-station model's 67 second throughput. Because of this, the two-station model is always superior to the one-station model.

Finally, we have the three-station model in which each activity is broken into its own station.

In this situation, the capacity is dependent on the bottleneck station's capacity which is the second station, which has a capacity of one customer every 27 seconds. This is better than the single station's ability to serve one customer every 67 seconds, and in this situation the two-station set up's ability to serve a customer every 42 seconds.

However, as mentioned before, the three-station setup can be equal to the capacity of the two-station set up. If we were to change the capacity of activity B to under to 10 seconds then that model would have the same bottleneck at the three-station model with an overall capacity of 25 seconds per customer served. The three station model would continue to do just as well as the two-station system at its very worst.

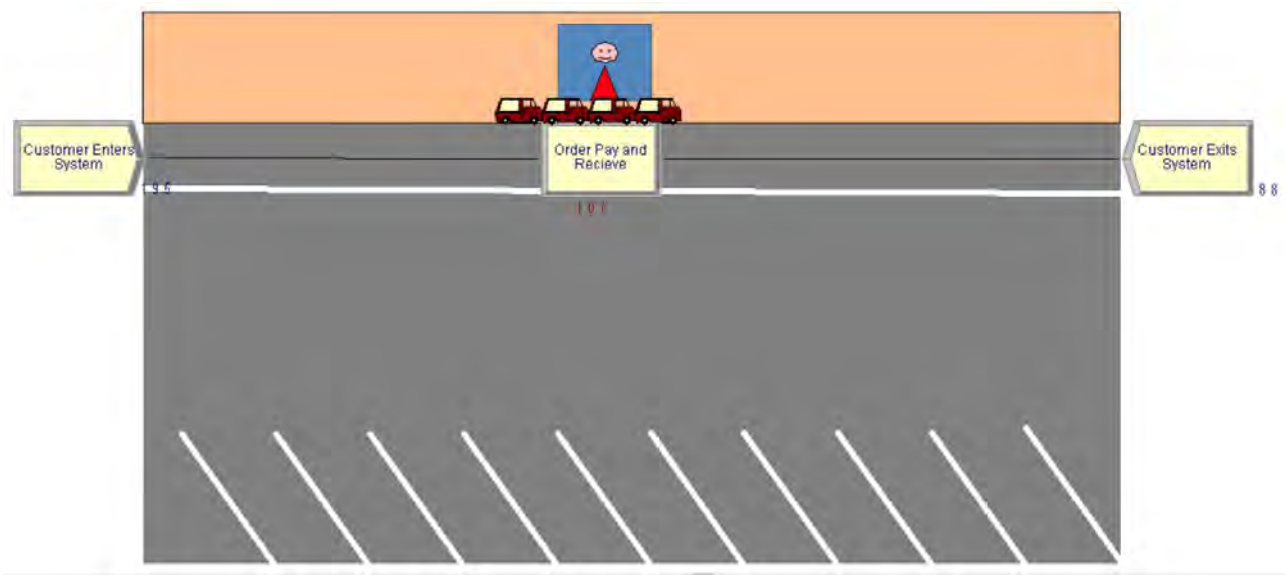
Further Application

In general, when one goes to a drive-thrus there are many businesses that will take advantage of a single station drive-thru system. A perfect example of this are drive-thru beer distributors. At these drive-thrus,

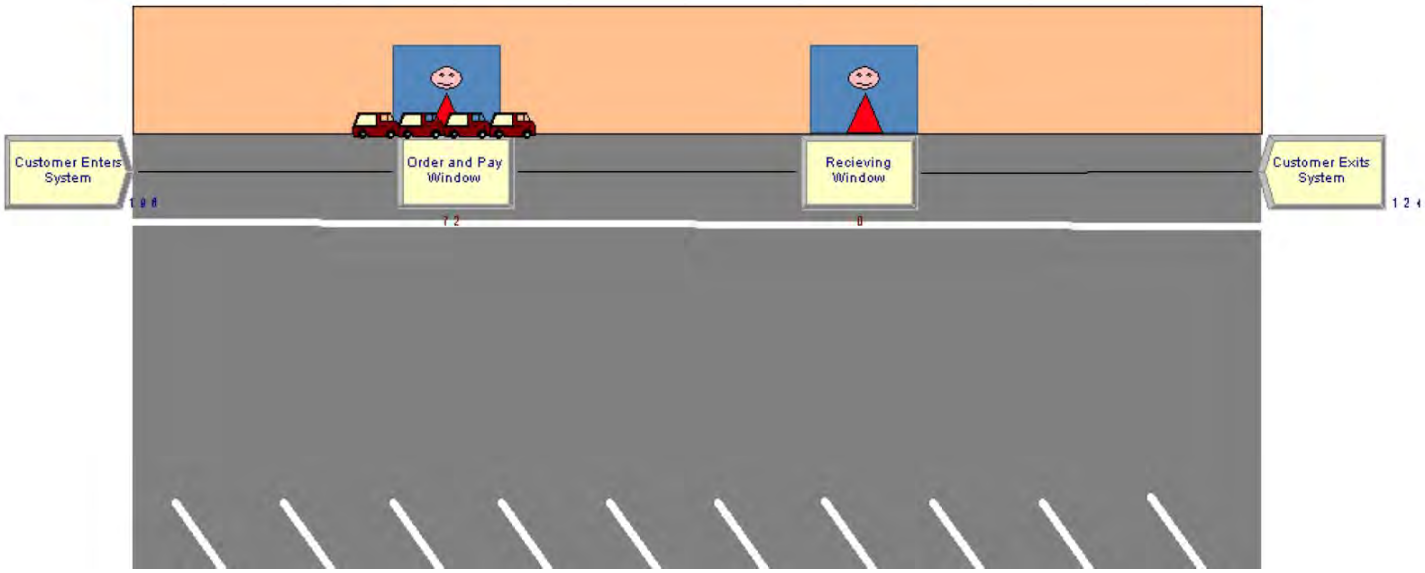
customers pulls up to the window in their vehicle, they place their order and then immediately receive their order from that single spot. For other drive-thru businesses, such as many Burger King locations, it is common for there to be a two station drive-thru implementation. At the first station, the customer places the order and then makes their payment and consequently receives the food at the subsequent window. In even rarer occasions, it is also possible for the customer to encounter a system where they place their order and make their payment and *then* receive their food at a second window. Lastly, other fast food chains such as McDonald's or Chick-Fil-A provey customers with three station drive-thru model. At the first station the customer orders, at the second station the customer pays, and at the final station the customer receives their order. Overall, no matter what drive-thru configuration, a customer can expect to spend the same amount of time time sitting in their car waiting for their order. However, as noted previously, why would businesses elect to have complex drive-thru's with three stations versus a one step model? As mentioned before the answer is *throughput*. In any drive-thru system there are three crucial activities: order placement, payment, and order reception. By breaking up each of these activities, the business can improve their ability to meet customer demand and therefore create a system that can be more profitable.

In order to confirm our drive-thru data, the software ARENA was implemented. ARENA is an event simulator software used in supply chain and healthcare scenarios. Through the use of ARENA we can better calculate the effects throughout our supply chain, which in this case are drive-thru's. For each simulation, there are several elements that must be held constant. For example, each of the four simulations takes place over the course of what are "peak hours" of the business lasting an approximate three hours. In other words, when the business can expect a high flow of customers. In the simulation a customer arrives 55 seconds on average following distribution. The activities of ordering, paying and receiving the food on average take 50 seconds, 40 seconds, and 25 seconds respectively and follow an exponential distribution. As we have come to learn an average customer of all four simulations can expect to spend 115 seconds in line time from the start to finish, the throughput changes drastically depending on how the business decides to break up the activities. The following are images depicting drive-thru ordering stations with the use of ARENA software.

The first model in the simulation is the single order drive-thru station. As one can see, the system was able to process a total of 88 customers, while leaving 107 customers, still in the queue after the three peak hours have come to an end. The following is an image:

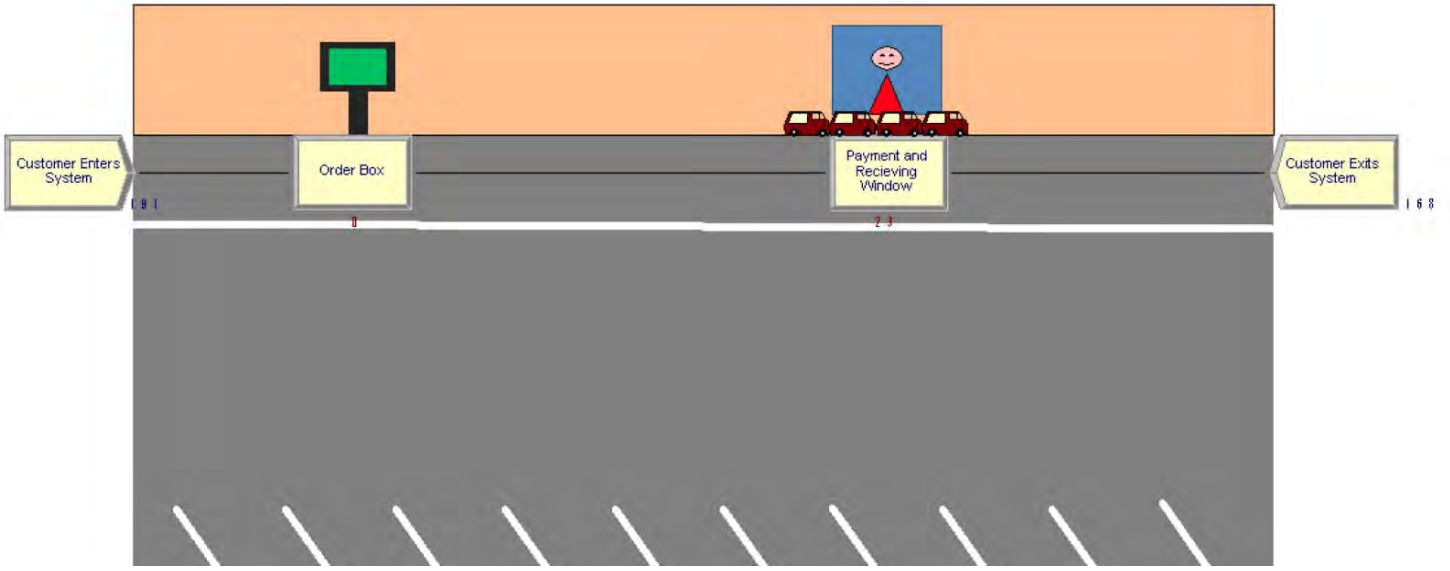


Moreover, businesses utilizing the two level system see increased customer capacity, which varies depending on which way they decide to split the activities. First, let us explore the set up where the customer orders, and pays at the first window, and then receives the order at the second window, as seen below.



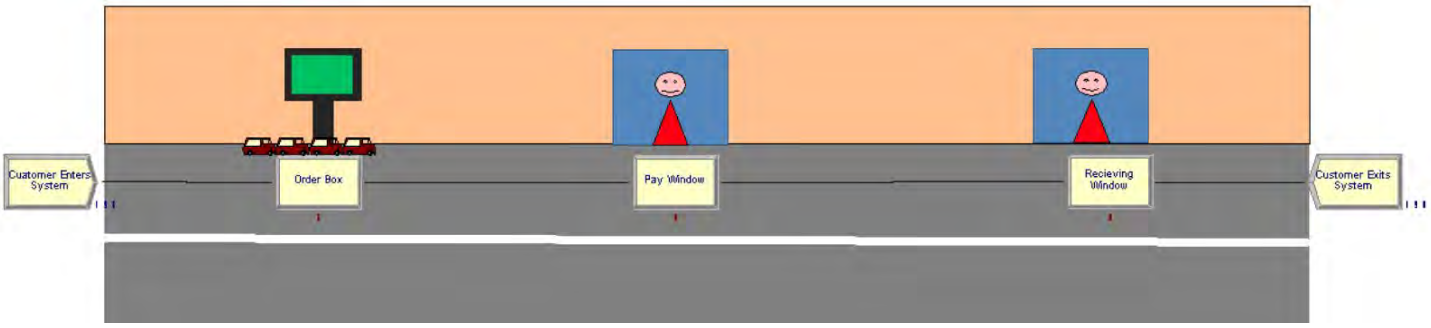
Ultimately, the two level system allowed for 196 customers to enter the system, process a total of 124 customers, while also leaving 72 in the queue at the order and payment window.

The other option for a two level ordering system is to have the customer order at the first station and then receive their order at the subsequent window. The simulation looks like the following at the end of a three hour period:



It is important to note that this model performs much differently from the other two level ordering systems. In this model an astonishing 191 customers entered into the system. This model was able to process a total of 168 customers over the same three hour span, a drastic improvement over the other two station ordering systems; but there is also another difference. Now, much more inventory is being held at the second station, as opposed to the other two level models that saw most of its inventory buildup at the first station. This is due to the fact that customers place their order at the place they pay for the order. This model causes the bottleneck to last a whopping 90 seconds. If the customer pays for and receives their order at the same station instead it shortens the bottleneck activity to 65 seconds, thereby improving throughput.

Lastly, by breaking up all three of the activities even more improvements can be made. This fourth and final system allowed for 198 customers to enter the system in the three hour period, and process a total of 190 customers, leaving 8 in inventory-- all of which are stuck waiting for the ordering station. This is intuitive because the ordering station has now become the system's bottleneck activity, lasting a total of 50 seconds per transaction. The model is portrayed as the following:



Future Work & Limitations

An important limitation of this study is that the models employed assume demand is constant. However, in reality demand is variable. This variability can cause temporary inability to meet demand. It is for this reason we have utilized softwares such as ARENA to simulate and evaluate the impact of demand variability on throughput given the structure of the drive-thru. The application of a simulation to drive-thru's is not novel, Swart & Donno (1981) applied simulations to Burger King. However, the application of simulation to assess drive-thru structure is novel and so is our work.

Another factor that is often overlooked when analyzing drive-thru's and their efficiency is the accuracy of the orders placed. While it's important to consider how many orders a drive-thru can process in a given time, it is also important to consider the accuracy of these orders.. For example, in a situation where one drive-thru chain can process more cars than another, but the competing chain has a higher order accuracy rate, who is delivering the best service to its customer? In the QSR industry, some chains are much more accurate with their orders than others. Consider Carl's Jr., who in 2016 had an accuracy rating of 96.7% (Oches, 2016), while Panera Bread took last place with a measly 82.6% (Oches, 2016). In the end, Carl's Jr.'s customers will be more satisfied and more likely to return, rather than Panera who is more likely to give a customer an incorrect order. This is another limitation of the QSR measure in that it fails to adequately factor in order accuracy.

Moreover, with technology continually improving to better meet customers demands and needs, as mentioned before it will also shape the future of the drive-thru industry. To reduce wait time when ordering, some restaurants have begun researching applications for mobile devices on which you can pre-order your food, and pick it up. The recent emergence of drones is also likely to affect the drive-thru

industry, making placing and fulfilling orders more convenient for customers. The use of drones also presents the possibility for delivering these orders directly to customers.

Conclusion

In summary, our research has shown, using elementary algebra and supporting ARENA software, that drive-thru structure impacts drive throughput and consequently drive-thru profit-making ability. Overall, the evidence presented in this research indicates a new performance rating should be created in order to accurately measure QSR drive-thru experiences. Through accurate measures a firm is able to analyze its performance and deliver outstanding service to its customer, and as mentioned before, maximize profits. Supply chain operations give us a window into how firms operate as well as their possible potential.

Additional Resources

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STIMULATING CREATIVITY THROUGH MINDFULNESS PRACTICES WITHIN THE INFORMATION SYSTEMS CURRICULUM

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ABSTRACT:

Mindfulness has become an increasingly important practice established within workplaces to stimulate creativity and organizational awareness. Mindfulness is referred to as the process of engaging in the present and being aware of your surroundings to raise levels of focus (Batalo, 2012). Due to the increase in complexity of IT use, mindfulness has specifically become prominent in the field of information technology and computer science to counteract hypersensitive technical environments. High-reliability organizations, such as air traffic control systems, naval aircraft carriers, and nuclear power operations, are critically dependent on seamless IT performance since the slightest technology or system error can send the organization to a crumble. Organizations as such are required to respond to potential threats by sustaining high levels of mindfulness (Valorinta, 2009). IT leaders within these organizations are engaging in mindful practices to improve their managerial conduct. This mindful engagement by leaders can spur IT innovation within one's organization to reveal dynamic perspectives in workplace performance and decision making (Lu, 2010). In this paper, we research various technology organizations to recognize, classify, and rank the use and impact that mindful practices have on the organization. By analyzing the behaviors of the organization's technology leaders and current industry cultures, we look to identify the best practices that help technology organizations maintain sustainable levels of mindfulness. The identified practices will be incorporated into the environments of Information Systems classrooms to aid the students in developing cognitive skills necessary in preparation of the future IT leader's career track within modern organizational cultures. The increase of mindful practices by Information Systems students is expected to increase their perceptions of creativity and tendencies to learn in their educational curriculum and long-term professional career (Lourenço, 2011).

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STRATEGY VERSUS STRUCTURE: A CREATIVE ENTREPRENEURIAL PERSPECTIVE

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ABSTRACT

As strategy began to influence scholarly research, Chandler argued; strategy precedes structure (Chandler, 1962). Changes in strategy required changes in business structure (witness the multidivisional firm of the 1960s). Certainly this sequence was supported by others across time (Ansoff, 1965; Amburgey & Dacin, 1994; Galan & Sanchez-Bueno, 2009). However, other scholars have questioned this sequence and have proposed other supported alternatives (Bower, 1970; Hall & Saias, 1980; Fredrickson, 1986). This paper proposes the entrepreneur's orientation towards structure and strategy can be reveal metaphorically.

PAPER

More recent world events has seen the emergence of the network organizations which can form and reform (Bartlett & Ghoshal, 1993; Hedlund, 1994) supported, in part, by advances in technology (Takahashi, 2016). Indeed whether that "technology" is meant in the high tech, information technology as implied by Takahashi (2016) or if it is meant in the manipulation by people or the development of processes and routines version proposed by Weick (1979) and supported by Galbraith (2014) , both aspects seem equally important when it comes to the designing of a firm. Furthermore, Mintzberg has claimed that there should be a cycling between strategy and structure (Mintzberg, 1990) which has also received some confirmation (Galan & Sanchez-Bueno, 2009).

ENTREPRENEURSHIP PERSPECTIVE

Entrepreneurs initiate an organization's structure (Stinchecombe, 1965)using both technology-mediated and person-mediated means. The entrepreneur also makes the choice as to the purpose of the organization and whether it will be to generate economic returns or if there are other goals such as just having the experience (Black, Megehee, & Fabian, 2016).

One measure of fit between strategy and structure is coherency across the two constructs. Black and colleagues have successfully determined coherency in a small business through the use of animal metaphors. From an entrepreneurship perspective, the choice of structure (sole entrepreneur |group entrepreneur) and the choice of strategic goal (Economic competition or experiential focus) may arise from a general orientation of the initiating individual and be revealed through metaphoric use.

I look at students in a college to determine if their orientations towards doing school work and their goal of being at school are also aligned and their ability to successfully attain a collegiate goal. The method of using animal metaphors is explained and the results of a preliminary study will be shared.

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Tax Policies that Encourage Tenant Medical Office Building Green Utility Retrofits

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Abstract

This paper exams the financial impact of upgrading an existing medical office building with an energy efficient design or equipment from a tenant/lessee perspective. The empirical study highlights the importance of utility cost, credit availability and producer price index for office construction on the amount of medical office building spending put in place. The independent variables prime interest rate, cost of natural gas per therm and electricity cost per KWH are significant variables. A cost-benefit model is developed that inputs several personal income tax rates, incorporates a debt-service coverage ratio, analyzes investment tax credit and rebate scenarios and varies the level of energy savings. The cost- benefit case study results provide insight into which factors enable higher net construction spending when considering a green energy retrofit project. Both the regression model and the case study model focused on the tenant who rents medical office space using a triple net lease. The tenant paradigm limits the analysis to energy savings, the tax implications of having these savings and benefits associated with borrowing when financing the green retrofit. The availability of low cost borrowing and increased investment tax credit (ITC) rates increases net retrofit construction spending.

TEACHING COST ACCOUNTING: A FOCUS ON BAD DEBTS AND PURCHASES DISCOUNTS IN THE CASH BUDGET

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INTRODUCTION

This paper presents materials that have been used in the classroom to teach cash budgeting procedures and which, based on exam results, have helped students better understand the workings of a cash budget. An overview of the cash budget is first presented, followed by problems involving projected cash collections and budgeted accounts receivable, first without and then with bad debts. A focus on budgeted cash payments (and accounts payable balances) is next presented, first without and then with purchases discounts. These areas capture the key determinants in the cash flow of a business and are crucial in forecasting and then maintaining adequate liquidity for effective business operations.

OVERVIEW OF THE CASH BUDGET

The cash budget is among the final steps in the budgeting process. In its simplest form, the cash budget shows the beginning balance of cash, plus cash receipts for the period minus cash disbursements for the period, which leaves the ending balance of cash. Cash receipts are usually primarily from sales or services for which the business is known. Most sales or services are first made on account, with some expected collection pattern for the receivables that is projected over time. Cash payments are similar in that items are usually first purchased on account. Then, when it is determined that the correct quantity (and quality) of purchased items has been delivered, payment is made. Also appearing on the cash budget are expected cash payments for selling and administrative expenses and capital budgeting expenditures expected to be made by the company. Textbooks often present problems in a simplified form. For example, only the cash outlay for a capital budgeting project is presented, rather than detailed capital budgeting data. Also, a textbook statement is usually made that all selling and administrative expenses, other than noncash items such as depreciation, are "paid as incurred." Students know that few businesses pay selling and administrative expenses as incurred, so it is helpful to use an illustration, similar to the following:

Company A had salaries payable of $20,000 at the end of last year, December 31, 20X1. During 20X2, salaries expenses totaled $900,000. If there are zero salaries payable at the end of the year, December 31, 20X2, how much cash did Company A pay during 20X2 for salaries? Answer: $920,000. Suppose, however, that during 20X2 consultants for Company A are trying to prepare a cash budget for the year. When management is asked whether there will be any salaries owed at the end of 20X2, management may likely ask, "What was owed at the end of last year?" Upon hearing $20,000, management might think that is about right for the end of the current year, too. Obviously, it is extremely dangerous to just use last year to predict this year. Some would say that is like driving down the road and only looking in the rear-view mirror – which would be disastrous. However, it is also not advised to drive down the road without a rear-view mirror – but only for the proper use – so that it can be glanced into to see the past, but the focus should be on the future. However, for Company A, the best estimate for the current year might be the $20,000 from last year. Accordingly, if the estimated amount for salaries payable for the end of 20X2 is $20,000, how much is the budgeted cash payments for salaries for 20X2? Answer: $900,000. This means that if the amount owed at the end of the current year is expected to be the same as the amount owed at the end of last year, then all noncash selling and administrative expenses can be treated as if they are paid as incurred and the numbers will work out correctly. Accordingly, the "paid as incurred" statement in textbooks can be followed, even though it likely means "can be treated as if paid as incurred."

PROJECTED CASH COLLECTIONS AND BUDGETED ACCOUNTS RECEIVABLE, WITH AND WITHOUT BAD DEBTS

Perhaps the most important number on the cash budget is the projected cash inflow from the ongoing sales and services of the business. This liquidity stream is critical to a business. Even if a business has profitability, if its cash expenditures exceed its receipts to the point of being unable to make cash payments when due, the company is in major financial trouble. Accordingly, problems involving cash receipts from sales or services, both with and without bad debts, are very important. Sparse coverage of bad debts, however, is included with the coverage of cash budgets in textbooks. By first working a cash collections problem without bad debts and then using the same problem with the more realistic scenario of a few bad debts, it is easier to see the impact of bad debts on the budgeting process. Consider the following:

Part I: Company B projects the following cash collections from sales:

Budgeted Sales:	March	$100,000
	April	150,000
	May	300,000

The collection pattern, based on the past experience of Company B, is projected as follows:

Sales are 20% for cash
The remaining 80% is collected
70% in month of sale
30% in the next month

Questions:
What are the projected cash collections from sales for May?
What are budgeted accounts receivable on May 31?
Answers:
Budgeted cash collections from sales for May are as follows:

20% of May's $300,000	=	$ 60,000
70% of 80% of May's $300,000	=	168,000
30% of 80% of April's $150,000	=	36,000
		$264,000

Budgeted accounts receivable on May 31:

30% of 80% of May's $300,000	=	$ 72,000

Part II: Company C is identical to Company B except that 1% of credit sales is never collected and it is written off as a bad debt at the end of three months. Accordingly, Company C projects the following data:

Budgeted Sales:	March	$100,000
	April	150,000
	May	300,000

The collection pattern, based on the past experience of Company C, is projected as follows:

Sales are 20% for cash
The remaining 80% is collected
70% in month of sale
29% in the next month
1% is never collected

Questions:
What are the projected cash collections from sales for May?
What are budgeted accounts receivable on May 31?

Answers:
Budgeted cash collections from sales for May are as follows:

20% of May's $300,000	=	$ 60,000
70% of 80% of May's $300,000	=	168,000
29% of 80% of April's $150,000	=	34,800
		$262,800

Budgeted accounts receivable on May 31:

29% of 80% of May's $300,000	=	$ 69,600

But, it would actually be shown as

30% of 80% of May's $300,000	=	$ 72,000	
+ 1% of 80% of April's $150,000	=	1,200	
+ 1% of 80% of March's $100,000	=	800	
Budgeted accounts receivable (gross)		$ 74,000	May April March
Less the Allowance for Bad Debts		4,400	⟹ ($2,400 + $1,200 + $800)
Budgeted accounts receivable (net)		$ 69,600	

Note that to simplify the problem it was stated that bad debts are written off at the end of three months. This means that February's bad debts would be written off at the end of May. Many companies carry bad debts considerably longer before writing them off, which would make budgeted gross accounts receivable and the budgeted allowance for bad debts larger, but would not change the amount for budgeted net accounts receivable. Also note that bad debts will not show up on the cash budget. This also illustrates the difference between what is important and what is relevant. It is very important that one percent of total credit sales is never collected. In fact, it might be significant enough to cause liquidity problems that could cause the business to be unsuccessful. However, the one percent of total credit sales that goes uncollected, while important, is not relevant to the cash budget and does not show up on the cash budget at all.

PROJECTED CASH PAYMENTS AND BUDGETED ACCOUNTS PAYABLE, WITH AND WITHOUT PURCHASES DISCOUNTS

Since cash payments are controlled by the company planning the budget, it is much easier to forecast cash payments than cash receipts. However, regardless of budget projections, a slowdown in cash receipts usually translates into a slowdown in the ability to make payments, thus creating a domino effect with cash receipts being the driver. Nonetheless, a plan for cash payments is a top priority for a business, for both liquidity and administrative control purposes. One of the major problems faced by a business is not just paying its invoices, but ensuring that the invoices are for something that was indeed ordered by the company, that the items were in fact received and were the type and quality ordered, and that the invoice is still outstanding and that the company is not about to pay for something for the second time. The following problem assumes that the amounts owed are proper and that the amounts involve cash payments for merchandise purchased, first without purchases discounts and then with purchases discounts as part of the budgeting process. Consider the following:

Part I: Company D projects the following cash payments for purchases of merchandise:

Budgeted Purchases:	September	$ 200,000
	October	250,000
	November	350,000

The payment pattern, based on the past experience of Company D, is projected as follows:

All purchases of merchandise are on account
Pay 1/2 in month of purchase
1/4 following month
1/4 second month after purchase

Questions:
What are the projected cash payments for purchases during November?
What are budgeted accounts payable on November 30?

Answers:
Budgeted cash payments for purchases during November are as follows:

1/2	of November's	$350,000	=	$175,000
1/4	of October's	$250,000	=	62,500
1/4	of September's	$200,000	=	50,000
				$287,500

Budgeted accounts payable on November 30:

1/2	of November's	$350,000	=	$175,000
1/4	of October's	$250,000	=	62,500
				$237,500

Part II: Company E is identical to Company D except that a 2% purchases discount is always taken at time of payment on all merchandise purchased. Company E uses the gross method for purchases discounts. Accordingly, Company E projects the following data:

Budgeted Purchases:	September	$ 200,000
	October	250,000
	November	350,000

The payment pattern, based on the past experience of Company D, is projected as follows:

All purchases of merchandise are on account
Pay 1/2 in month of purchase
1/4 following month
1/4 second month after purchase

Questions:
What are the projected cash payments for purchases during November?
What are budgeted accounts payable on November 30?

Answers:

Budgeted cash payments for purchases during November are as follows:

1/2	of November's	$350,000	=	$175,000	x 98%	=	$171,500
1/4	of October's	$250,000	=	62,500	x 98%	=	61,250
1/4	of September's	$200,000	=	50,000	x 98%	=	49,000
							$281,750

Budgeted accounts payable on November 30:

1/2	of November's	$350,000	=	$175,000
1/4	of October's	$250,000	=	62,500
				$237,500

A slight expansion of the problem leads to a most interesting facet of dealing with purchases discounts. Based on the data above, what would be the budgeted purchases and purchases discounts figures that would show up on a budgeted income statement for the month of November? Purchases would equal $350,000 for November, which is an accrual-based number. For purchases discounts, however, some students might be tempted to conclude that the answer would be $7,000 (which is 2% of $350,000). However, $7,000 is not the correct answer since the amount for purchases discounts, even though on an accrual-based income statement, is based on the cash payments pattern for purchases and would be $5,750 (which is 2% of $175,000 + $62,500 + $50,000 in the illustration above).

SUMMARY AND CONCLUSIONS

The highlight of this paper is planning for liquidity. Even though the first step for many businesses in planning for the future might still be focused primarily on profitability – profitability without liquidity is not a formula for success. Accordingly, an increased focus on liquidity should prove very beneficial to students in preparing for the business world where cash flow is a constant concern and a major determinant for future business success.

TEACHING DATA VISUALIZATION WITH TABLEAU: CASE OF "TOPBABYNAMES"

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ABSTRACT

The effect of Big Data growth is felt everywhere. It is especially affecting how organizations are conducting their business to stay competitive in the market place. The term "Big Data" is commonly used to data sets that are too large and/or too complex to be processed by traditional approaches. Data science is now a thriving area of research which forms new ways of dealing with the problem. As a result business schools pay more attention to business analytics which incorporates research, interpretation, and visualization of data in a way to make insights into business processes easier even for a user without special analytics training.

In time when the amount of available data is enormous just using descriptive statistics in many cases may lead to useful conclusions about the processes and/or better understanding problem areas of business. Data Visualization software Tableau may be used in a classroom to make business students aware of a wider phenomenon of big data and provide them with a relatively easy tool to describe the data.

As with any new software, the important task of educators is to find data sets and data problems which are easily understandable and manageable by students and still close to real life tasks. We will show that an Excel file "TopBabyNames" available from Teradata University Network is a valuable source for creating an engaging and useful teaching kit. The file "TopBabayNames" contains 5000 records with more than 5 million occurrences of most popular baby names used in over 100 years in USA. We will show that this file provides ample opportunities to introduce main features of Tableau and use many different advanced types of charts not easily available in Excel. The topic is of interest to students and they can easily form different research questions themselves to create their own stories in charts about the most popular names.

TEACHING THE LANGUAGE OF BUSINESS TO THE CLINICAL SIDE

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ABSTRACT

Demystifying revenues and expenditures in healthcare organizations is offered as a prescriptive measure for managers to increase the adoption and implementation information system success in healthcare by teaching the language of business to the clinical side by using a simpler explanation of how an organization becomes and stays profitable. A simple diagram is offered as a more intuitive way to explain business costs and why each healthcare worker must understand the "why" of staying profitable. Anecdotal evidence suggests that healthcare professionals can be just as blind to business realities as other workers.

INTRODUCTION

The traditional operating structure of hospitals, nursing homes, and clinics is based on the logic of the business function [1]. In this context, corporations do not assume responsibility for clinical processes or outcomes and avoid interfering with the decision making of medical staff. The primary role of healthcare administration was to provide the clinical function with support and resources, including capital, facility construction, maintenance, personnel administration, billing, collections, and so on. The traditional structure of clinical services in most healthcare settings was based on medical specialty and nursing services. In hospitals, this structure consists of pediatrics, surgery, internal medicine, among others and is organized by hierarchy within clinical departments. These departments then had dual responsibility and accountability. First to the attending physician and the orders of those physicians and second to the healthcare administration. It is clear that these traditional autonomous and hierarchical structures are incompatible with the design of electronic information systems and the shift toward outcome based medicine [1]. It is also clear that in this traditional environment, few healthcare professionals understood business concepts or the need to integrate information technology across clinical and business processes nor did they have a need to.

The successful implementation of an information system is closely tied to a clear strategic direction of the organization and an understanding of the data along the organizations value chain needed to deliver a successful outcome. To this end, all employees and healthcare professionals must understand the desired outcomes of the organization and the part they play in achieving the organizations strategic goals. Healthcare as a service industry, differs from product industries, in that, value comes from the work process and the clinical outcome. Prior to the Patient Protection and Affordable Care Act of 2010, the financing and regulatory environment was incongruent with the value enhancing trends of information technology needed

for patients to leverage the power of the Internet to improve patient outcomes. Information Technology (IT) enables profound changes in almost every aspect of how healthcare is operated and alters the traditional view of how services are accessed, received, coordinated, paid for, and medical information accessed. Research into the effect of a health professional's role and relationships in this new environment has found that competition between and among professionals negates or neutralizes the advantages of IT [2]. It is believed that a better understanding by healthcare professionals in the how, what and why their organization generates revenue and expends resources would improve clinical outcomes and acceptance of IT [3]. To this end, we offer a simpler explanation of the relationship of revenue and expenditures to profit congruent with the traditional healthcare professional's view of the business function.

We begin with an overview of accounting and profit equations and then discuss an alternative presentation of healthcare revenue and costs. A detailed listing of healthcare revenue streams and costs follows suggesting healthcare workers who better understand the healthcare business structure will be more willing to support structural changes in the organization that lead to improved business efficiencies and better clinical outcomes.

BASIC ACCOUNTING

Business intelligence (BI) and healthcare analytics are technologies that provide analytical capability to help healthcare organizations improve service quality, reduce costs, and manage risks [4]. The effort to adopt Health Information Technology (HIT) with financial incentives and penalties attached to the Patient Protection and Affordable Care Act of 2010 was step in the right direction, but establishing policies are easier to pen than implement. The challenge faced by many healthcare organizations is the lack of technical and organizational infrastructure, as well as skilled man power [5]. The Healthcare Leadership Alliance (HLA), a consortium of six major professional membership organizations suggests five competency domains common among all practicing healthcare managers: 1. communication and relationship management, 2. professionalism, 3. leadership, 4. knowledge of the healthcare system, and 5. business skills and knowledge [6]. Skilled manpower exists but lacks the understanding to find the balance between clinical outcomes and data driven business decisions. While business training exists for many healthcare professionals it is thought that approaching business viewpoint from the traditional relationship between the clinical side and the business side of healthcare would lead to a better understanding of where we are and where we are going.

Business professionals are familiar with the basic accounting equation but rarely those outside of business or business education. Knowledge of this equation is considered the domain of finance and accounting experts and not the average healthcare professional. The basic accounting equation, also called the balance sheet equation, represents the relationship between the assets, liabilities, and owner's equity of a business. It is the foundation for the double-entry bookkeeping system [7]. For each transaction, the total debits equal the total credits. It can be expressed as:

Assets = Capital + Liabilities ($\alpha = c + l$)

In a corporation, capital represents the stockholders' equity. Since every business transaction affects at least two of a company's accounts, the accounting equation will always be "in balance," meaning the left side should always equal the right side. Thus, the accounting formula essentially shows what the firm owns (its assets) that are purchased by either what it owes (its liabilities) or by what its owners invest (its shareholder's equity or capital).

The expanded accounting equation shows the accounts that make up owners' equity. Instead of the accounting equation, Assets = Liabilities + Owners Equity, the expanded accounting equation is:

Assets = Liabilities + Owner's Capital + Revenues – Expenses – Owners Draws.

The stockholders' equity part of the basic accounting equation can also be expanded to show the accounts that make up stockholders' equity: Paid-in Capital, Revenues, Expenses, Dividends, and Treasury Stock.

Instead of the accounting equation, Assets = Liabilities + Stockholders' Equity, the expanded accounting equation in a corporate setting is:

Assets = Liabilities + Paid-in Capital + Revenues – Expenses – Dividends – Treasury Stock.

While important, the basic accounting equation isn't intuitive and does little to show the average healthcare professional the role they play in producing revenue for the organization. It doesn't connect well with the traditional view of the business side supporting the clinical side of healthcare.

PROFIT

There is value in understanding profit. The average person understands that in order to calculate profit, one must find the difference between the revenue brought in and the numbers of dollars spent going out of the business or organization during a set period of time. In essence, profit is calculated by adding the number of dollars brought in, minus the number of dollars taken out of the organization. To properly calculate profit there must be an understanding of what types of goods and services bring in revenue and what the healthcare organizations expenses might be [7].

More formally, we can calculate profit by taking the difference between total revenue and total expenses. Total revenue is all the money the healthcare organization makes by selling all its products and services. Total expenses can be very diverse but generally includes items that are directly involved in the production of the item or service such as materials, shipping costs, and merchant fees. It does not include overhead items such as office supplies, administrative costs, legal fees, or rent payments.

The value you get for your healthcare organizations profit represents the amount of money it has earned in the time period you are focusing on. This is money that the healthcare organization can do whatever it pleases with. They may use the money to re-invest in the business, pay off a

loan or simply save it. If your business generates a negative profit, this means that, for the time period you are focusing on, your business spent more money than it made. For nearly all businesses, this is something to be avoided, though, at the beginning of a business's life or for significant changes in the businesses strategic direction, this is sometimes unavoidable.

In general, start with your net sales which is the amount of money generated by the business from selling its goods and services, minus returns, discounts, and allowances for missing or damaged goods or services not provided.

Add any one-time revenues. In addition to having extraordinary expenses, a business can also have one-time sources of income. These can include business deals with other healthcare companies, the sale of tangible assets like equipment, and the sale of intangible assets like copyrights and trademarks. You now have net sales.

In order to calculate gross income, subtract the cost of goods sold (COGS). Healthcare businesses have to spend money to make money. Products need to be assembled from raw materials. Services must be available to the patient. Neither raw materials or labor are free, thus it costs the business money to make the products or provide the services they sell. This cost is called the cost of goods sold, or COGS. COGS includes the material and labor costs directly tied to the creation of the product or service being sold, but not indirect expenses like distribution, shipping, and sales force pay. Subtracting COGS from net sales gives a value called gross income.

The next step is to subtract all operating expenses. Companies don't just have to spend money to sell their products and/or services to consumers. They also have to pay their employees, fund marketing efforts, and keep the lights on at their offices. These expenses are collectively called operating expenses and are defined as the expenses needed to keep the business running that are not directly related to the manufacturing or implementation of the products or services being sold.

Healthcare organizations must also subtract depreciation/amortization expenses. Once you've subtracted your business's operating expenses, you'll want to subtract expenses due to depreciation and amortization. Depreciation and amortization are related (but not identical) expenses. Depreciation represents the loss in value of tangible assets like equipment and tools due to wear and tear from normal operation over the lifespan of the asset, while amortization represents the loss in value of intangible assets like patents and copyrights over the life of the asset. Subtracting these expenses from your running total after subtracting operating expenses gives you your business's operating income [7].

Subtract any other expenses. Next, you'll want to account for any extraordinary expenses that can't be attributed to normal business operations. These can include expenses due to loan interest, paying off debts, buying new assets, and more. These can vary from one accounting period to the next, especially if the company's business strategy changes.

Subtract taxes to find your net income. Finally, when all other revenues and expenses have been accounted for, the last expense that is usually subtracted from a business's revenues on an

income statement is its taxes. Note that taxes may be levied on a business by more than one government entity (for instance, a business may need to pay both state and federal taxes). Additionally, tax rates can change based on where the company does business and how much it makes in profits. Once you've subtracted your expenses due to taxes, the value you have left is your business's net income, which can be spent as the owners please.

PROFIT FROM THE EMPLOYEES POINT OF VIEW

Calculating a healthcare organizations net profit is necessary but often complex and confusing to healthcare professional lacking a business background. In the traditional view of healthcare administration, the primary role of healthcare administration was to provide the clinical function with support and resources, including capital, facility construction, maintenance, personnel administration, billing, collections, and so on. The traditional structure of clinical services in most healthcare settings was based on medical specialty and nursing services. Thus, there was little need for the clinical side to understand the business function. Figure 1 suggests the traditional view of healthcare administration from the clinical point of view. This traditional view suggests that healthcare administration pays my salary first followed by benefits and taxes. These are the costs most employees see and care about. Overhead costs and administrative costs associated with a business come at the end after salaries and benefits are paid.

Anecdotally, the CEO of a specialty practice of over 40 doctors explains to his doctors that the income they generate goes first to pay their salaries. The next pot of money goes to pay their healthcare benefits, bonuses, professional travel, and annual training expenses. The next level of money pays their federal, state, and local taxes. Lastly, they pay the overhead and operating expenses of the specialty practice including staff salaries, legal fees, credentialing, and hospital negotiating costs. Interestingly, most doctors in this practice would have been happy earning just enough to cover their salaries and taxes. Many of the doctors undervalued the costs of their varied benefits and expertise provided by the CEO and his staff to prepare tax records, credentialing, and other administrative tasks. They had no idea what it took to keep the lights on and the practice running. It is for this reason that starting with salary as an entry point to explaining revenue and expenses seems useful.

This myopic view of expenses may be one of the contributing reasons more doctors are opting out of private practice and becoming staffers at hospitals. This view of business expenses allows them to receive a salary and let others worry about all of the other costs needed to run the business.

It is believed that teaching healthcare professionals more about where healthcare income comes from and how it affects their salaries, benefits, and taxes will lead to better engagement and cooperation with healthcare administrators.

Basic Salaries	The costs employees typically see and care about.
Basic Salaries + benefits	
Basic Salaries + benefits + Taxes	
Overhead Costs	Firm Infrastructure, Human Resource Management, Technology Development, and Procurement
Administrative costs	Salaries, benefits, and taxes of administrative support.

Figure 1 Healthcare Expenses

CATEGORIES OF EXPENSES AND REVENUES IN HEALTHCARE

Revenue

A primary source of revenue for healthcare professionals comes from the fees paid to private insurance companies by patients. Insurance companies that provide health care insurance operate on the principle that you'll be well more than you'll be sick and that they'll earn far more in premiums than they end up paying out averaged out across a population of patients.

Federal and State governments pay healthcare providers Medicare and Medicare fees. These fees come from taxes paid to the Federal and State governments.

The Federal and State governments also provide some revenue for the health care organizations through subsidies and grants which may pay for research and training opportunities.

A significant portion of healthcare revenue comes from out-of-pocket patient expenses. Health care patients generate the majority of revenue for the healthcare industry when they pay out of pocket for medical services. This occurs when they cover the cost of their care without the help of a third party based on the rates the healthcare facility sets.

A small but increasingly important source of revenue comes from private donations. Sometimes medical facilities receive donations from corporations or individuals. These individuals and corporations either believe strongly in the services the facility provides or they are seeking a tax deduction for their contribution. Typically, hospital administrators lobby for it within the community.

Expenditures

Labor Costs are a significant expenditure for healthcare organizations. As of 2008, wages and benefits accounted for 59.5% of a hospitals expenditure with other labor costs an additional 10%. Today, benefits and bonuses are no longer assumed. Data driven measures of productivity and

performance determine salaries and benefits. Performance is not just based on patient outcomes but a spectrum of measures across the total delivery of medical services

Other expenditures are the costs associated with appropriating state of the art test equipment and information technology. Healthcare providers under the Patient Protection and Affordable Care Act of 2010 are required to modernize and create Electronic Healthcare Records (EHR's) for their patients. Healthcare organizations must also consider the cost of integrating their EHR's with insurance companies, patients, government agencies and the business side to create a seamless and integrated business model.

Other costs include the procurement of medical supplies, business supplies and management of capital expenses.

Healthcare organizations also provide support for Community groups [8]. These costs can include volunteer time of healthcare professionals, use of equipment, and medical supplies.

Healthcare organizations must also pay for Human Resource Management (HRM) activities.

Lost Revenue

Healthcare organizations must consider bad debt. When medical care is needed, there is little time for the prospective patients to conduct a financial analysis to determine where the needed care can be purchased for the least amount of money or whether the cost of care is affordable. Hospital bills can result in surprising charges that many patients are not prepared for or able to pay. Challenges exist in collecting medical bills since patients frequently did not desire to incur the medical charges associated with the care and there are no tangible goods they can be repossessed due to failure to pay. This leaves the healthcare organization facing a decision. Should they write off the unpaid charges as charity care or should they pursue collection attempts and possibly be forced to write off the cost is a bad debt.

Generating Revenue

Healthcare marketing and analysis of data are important and can lead to additional revenue sources. For instance, emergency rooms. In the past, administrators believed this was the place uninsured people came to for medical attention when they had no other options. A large part of the expense ended up being uncompensated. This fact pushed hospital funding out of the emergency department and into other areas. The problem with this thinking is that most referral business actually comes through the emergency room. Doctors don't send patients to the admit desk if they need assistance during off hours. They go to the emergency room first for assessment and then get admitted. That shifts the focus from indigent patients in need of nonemerging care to those who actually have insurance but are showing up at the ER at their physician's request.

Work with the financial team to improve coding, resolve claims wasting away in accounts receivable, and asking patients for upfront payments [9].

Work with doctors and nurses to create new services that might generate revenue in the future.

Coordinate with doctors and staff to agree on common preference items [10]. Identify the most cost-effective, best-value devices, medications and other preference items that can help out profitability. Physicians who understand the relationship between expenses and profit can form physician-led "value analysis committees" that can make standardization of products more efficient.

Have staff review contract with eye to better service and efficiencies.

Invest in green projects and develop sustainability measures to increase energy savings.

Develop process teams to look at operating room, emergency room, and home health arenas for throughput issues [11]. Employees who are knowledgeable about expenses can help find ways to improves efficiencies and patient outcomes at lower costs [12].

Develop an ongoing dialogue between pharmacists and physicians to figure out which drugs are the most effective for clinical purposes and if there is any overlap with generics.

Consider mergers and other ways to share resources with other healthcare organizations to lower costs [13].

CONCLUSION

Future research would study how non-business healthcare employees receive different treatments in the approach to understanding business concepts.

The traditional relationship of clinical services and business services within a healthcare organization still exist. The government mandated decision to automate healthcare records requires clinical workers to acquire business savvy to understand the measures by which they are being evaluated. The business side is moving toward Enterprise Resource Planning (ERP) systems to provide for a better patient experience while lowering expenses and raising revenues. Organizations that have top management support, effective management of human resources, full involvement of the entire workforce including physicians, education and training, team working, continuous improvement, a corporate quality culture, customer focus and using a combination of management techniques under a quality management system are necessary for Total Quality Management (TQM) successful implementation. A business knowledgeable clinical staff, familiar with how revenue is generated and more importantly how expenses affect the bottom-line can be an asset to healthcare administrators seeking to improve quality but also business performance [14]. Business education that starts with salary as a focal point for clinical workers engages these workers in how the how and why of expenses and revenue.

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Technology-Based Instructional Supplements for Your Class – How Are They Changing Instruction and Learning Outcomes?

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ABSTRACT

In this session the presenters along with the audience will explore the use of technology-based supplements that are marketed as a tool to assist faculty with instruction and students with improved learning outcomes. The goal of the discussion will be to share the experiences of the authors with the attending faculty; encourage participation by sharing experiences of those attending; discuss the value of these supplements; and talk about what they can add to or detract from the learning environment of a class.

Particular attention will be paid to currently available supplements that accompany the books faculty use and require the students to purchase. How the publishing company book representatives market the whole package of textbook and the supplemental products will be discussed as well. Book representatives may offer to package the many combinations at a reduced cost as part of the bargaining process to adopt their products. To support using these

supplements they provide statistics of improved student grades with the use of their supplements. Like any tool its effectiveness depends on the quality of the tool but also on how the tool is used.

For the typical textbook adoption there are many things to consider in addition to the actual textbook itself. Many of the textbooks come with the options of choosing hard backed text, paperback text, loose leaf notebook style or electronic version of the text. Then for the textbook supplements it has become typical to have faculty lecture slides, student lecture slides, student solutions manual, homework on-line, lecture videos, computational software and possibly simulation software. Faculty have to decide what they will require for student purchase and what is optional for use at the student's discretion.

This session will encourage audience members to join in this discussion by sharing their experiences with classroom supplements. Faculty can make better selections by learning from others about the things that have worked and the things that have failed to achieve the desired or expected results. The supplements session participants can learn of the best practices of others in the overall desire of most faculty to improve the delivery process of information in the classroom. Participants will also be able to share their students' reactions to the use of the technology-based supplements.

INTRODUCTION

In the United States, the cost of textbooks since 2006 has increased by 73 percent.[1] Providing students with a good quality textbook has become imperative. Offering them several options to purchase their book has become a standard process of many professors. In the areas of math,

statistics, analytics, and other applications based classes the textbook is almost always required. Many of the classes adopt the on-line graded homework supplement and use it to encourage the student to practice and complete assignments outside of the classroom. Others use the on-line testing to provide immediate feedback to their students. Access to the on-line homework and testing is usually an additional cost to each student. Each of these may encourage honor code violations because of the lack of supervision when these assignments are given. The flexibility of time and location may help with test anxiety which can be a problem in these classes.

OVERVIEW OF PRESENTATION

The session leaders will use the presentation to conduct a lively conversation about differences and commonalities in current views and practices when it comes to book supplements. Student comments from past evaluations will also be shared in regards to the use of supplements.We share as practitioners and interactively explore some of the issues discussed above including:

- cost to students
- cost of intellectual compromise
- explore ethical considerations
- long/short range role of assessment
- compare /discuss the supplemental use currently used by the authors and those in the audience.

All faculties, but especially new/junior faculty choosing their classroom materials, may use this as an avenue to garner advice. Participants can solicit and compare products that have been established by other faculty teaching peer classes. Faculty charged with working on assessment criteria may use this as an opportunity to make comparisons or garner ideas that they can apply to their individual programs.

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The Application of the Business Canvas for Private Independent School and its Use in Curriculum

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PANEL DISCUSSION OF APPLICATION OF NEWER ENTREPRENEURSHIP TOOL

Management Track or Education Track

Session Name: The Application of the Business Canvases for Private Independent School Start-Up and its Use in Curriculum

Session Description: This panel session includes the lead entrepreneurial educator of the private school and the entrepreneurship faculty and discusses the process of creating the business canvas model for the private school start up. A comparison of the canvas model used by the CEO competition for students versus the foundational canvas is included. The pros and cons of using these model to teach entrepreneurial thinking to Freshmen and non-business students rounds out the panel topics.

Session Benefit to Members: The Business Canvas Model is an alternative for a full business plan that is used to present a short feasibility study of a potential start up. Entrepreneurship faculty have begun using this method in teaching entrepreneurship and the idea of "testing" ideas and tweaking results. This panel discussion represents faculty use of this method as a way to really learn the tool before teaching and where such methodology might be used in courses where the full business plan is not an appropriate tool.

Session Agenda (50 minutes):

Welcome and Introduction of Panelists (10 minutes):

Panelist 1: This Entrepreneurship faculty member has previously taught a course focused on developing a business canvas using the full model. She has over 20 articles a good third of which are focused on entrepreneurship especially in the pre-startup phase. She has also started three schools in the past and so has an entrepreneurial understanding of the school start up process.

Panelist 2: This member is a professional educator with experience in Title 1 programs, special education programs and has been motivated by current difficulties of students moving from High School to College to initiate a local private school that is independent of all governmental constraints and thus able to design and promote what works not what is legislated.

Panelist 3: This Entrepreneurship faculty member is the lead of a new entrepreneurial focus minor that is intended to provide support for non-business majors to gain an understanding and practical skill set of thinking and tools used by entrepreneurs to increase their chances of success. This panel member will be providing an assessment of this tool from the perspective of that new program.

Panelist 4: This Entrepreneurship faculty member is the lead of the freshmen business orientation course which is focused on the development of an internationally focused business effort. The course currently uses a modified business plan as part of its structure. This panel member will be evaluating this tool from the prospective of its use as a tool to introduce freshmen to business concepts.

Introduction of the two Business Canvas Models (5 minutes):

The general formal and similarities and differences of the two models will be presented by Panelist 1. This panelist will also introduce the general context of this example use and Panelist 2.

Introduction of the Independent Private School Background (5 minutes):

Panelist 2 will present the background to the decision to test the idea to start an independent private school.

The Development of the CEO Competition Canvas (10 minutes):

Panelists 1 & 2 will dialogue back and forth on the development of the CEO canvas and the sources of information used. They will then follow it with the extension of information from the full canvas.

Comments on the Use of the Canvas Model as a tool for Reaching Non-Business Students with Business Concepts (5 minutes):

Panelist 3 will present new minor and how this process and/or the canvas meets the goals of the new minor and if it would be a valuable tool to use in a general education course intended to teach entrepreneurial thinking.

Comments on the Use of the Canvas Model as a tool for Reaching Freshmen pre-Business students (5 minutes):

Panelist 4 will present the freshmen course and its current orientation. That project will be compared to this process and it will be assessed as to its value as a replacement or upgrade for the freshmen course.

Q & A (10 minutes):

All panelists will respond to questions posed by the audience and provide a debriefing to the panelist session.

The Digital Age: Advertising on Social Media and Its Effectiveness

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Abstract

The increasing usage of social media in today's society has led many advertising strategists to rethink how they present a company's products or services. In this research paper, the author introduces and proposes the benefits of advertising on social media and its influences on the viewer's psychology and purchasing decisions. The research discusses effective ways to advertise on social media and how to profit through advertising on social media. This study addresses the following research questions:

- What role does social media play in advertising?
- How can social media advertising create a decent return on investment (ROI)?
- What characteristics make advertisements effective on social media?

This research paper strives to present an effective social media advertising strategy and improve the way advertising is done.

Key Words: Social Media, Psychology, Advertising, Consumer Attention

Introduction

Social media has been rapidly growing since the early 2000s. Today, social media usage accounts for more than 28 percent of online usage. In other words, people around the world spend a great deal of time on social media (Cooper, Social Media, 2015). Popular applications such as Facebook, Twitter, Instagram, Snapchat, YouTube, and LinkedIn can be categorized as social media. Blogs, forums, video and audio podcasts, collaborative websites, and multiplayer online games are considered types of social media as well. Gaber & Wright (2014) defines social media as an interactive experience where individuals join together and exchange their experiences, reviews and opinions about different issues that they see in their lives (Gaber & Wright, 2014).

According to Gaber & Wright (2014), "the rapid digitalization of media and the advancement of information and communication technologies have changed the advertising field dramatically given the speed, immediacy and reach of information between suppliers and

consumers, and between consumers sharing information with other consumers (Gaber & Wright, 2014). Over time, advertisers have come to realize the opportunity they have with social media. Actually, marketers allocate a good share of their marketing budgets and expenditures for advertising media (Gaber & Wright, 2014). At a point in time, media such as newspapers, radio, and television seemed to be the greatest opportunity when it came to reaching mass audiences, or a segment of people. Collectively, social media applications reach billions of users worldwide, and that gives advertisers more than enough reason to pounce at the opportunity to broadcast a brand, company, or organization. The goal of advertisers is to catch consumers while interacting with social media.

Stelzner (2016) reviewed major social media platforms that resulted in interesting findings. After surveying more than 5,000 marketers, it was found that video usage on social media is crucial. 60% of marketers use video, and 73% plan on increasing their use of video. Live video, such as that through Facebook or Twitter's Periscope, is becoming increasingly popular as well. Advertisements are very popular on Facebook as opposed to Twitter. 86% of social marketers regularly use Facebook ads, and 18% use Twitter ads (Stelzner, 2016). Through social media sites, advertisers analyze users' individual interests and market to them accordingly. They are able to attach specific advertisements to relevant keywords being searched, making it easy for them to reach a target audience (Cooper, Social Media, 2015).

While these social media platforms get their share of revenue from advertisements from top brands, advertisers still ponder over ways to better reach their audiences through these advertisements. At least 90% of marketers want to know the most effective social tactics and the best ways to engage their audience with social media (Stelzner, 2016). It is imperative to know the best tactics and ways to engage with the target audience for a number of reasons (Stelzner,

2016). One very important reason is return on investment (ROI). Advertisers want to make sure what they invest in an advertisement will turn large profits by the end of the advertisement life span.

More research is being published in regards to social media advertising, but there still remains some aspects of it that have yet to be explored. There has yet to be research published that solely discusses the role of social media in regards to advertising, the effect social media has on advertising, and how it can create a decent return on investment. This research is to explore those aspects in one. Additionally, this research will provide advertisers with a new perspective on social media advertising and its importance to the advertisement of a brand, company, or organization.

Literature Review

Social Media

There has been a vast amount of research done in regards to society, at large, and their use of social media. Cooper (2015) reviewed the topic of social media and its impact on society. He defines social media as Internet-based applications and websites that promote the sharing of user-generated content, communication, and participation on a large scale (Cooper, Social Media, 2015). Social media includes, but is not limited to applications such as Facebook, Twitter and Instagram, blogs, and audio podcasts (Cooper, Social Media, 2015). The technology advance over the recent years has caused social media to become completely accessible on-the-go. Needless to say, the rise of social media is not done yet. This shift has caused advertisers to rethink the way they want to reach their target audiences as well.

Facebook

Skemp (2016) reviewed Facebook's impact on the world. According to her, Facebook is the world's largest online social-networking website, and reaches over 1.5 billion users around the world. When a platform is able to reach a diverse range of people around the world, an opportunity is revealed. Advertisers quickly grabbed the opportunity, and have been using it ever since. Facebook represented a revolution in advertising, because it provided not only a platform to broadcast advertising messages, but it also generated data to inform the successful targeting of those messages (Skemp, 2016).

Twitter

Encyclopædia Britannica (2014) described Twitter in regards to its inception and impact in the world. According to them, Twitter is simply a microblogging service for distributing short messages. At its conception, they were not an advertising hub, but today, they thrive through "Promoted Tweets". This form of advertising consists of advertisements that appear in search results (Encyclopædia Britannica, 2014). Mercadal (2014) views platforms such as Twitter a hub for online communities. When it comes to advertising, it is important to be familiar with these communities in order to advertise to the target audience (Mercadal, 2014).

Instagram

Cooper (2016) identified Instagram as "a photograph-sharing and social media mobile application for smartphones and tablets" (Cooper, Instagram, 2016). The application reaches over four hundred million active monthly users, and has a photo-share count of over forty billion.

Popular companies withing booming industries constantly use Instagram to market themselves. They admire the ability to "tell stories" through a single picture, and their pictures tell the stories of their brands (Cooper, Instagram, 2016). Many post pictures of sale items, store promotions, or even pay for "Sponsored" advertisements to show on users' feeds.

Social Media Content

Lee, Hosanagar, & Nair (2015) investigated the effect of social media advertising content on customer engagement on Facebook. Social media takes up a great portion of a firm's marketing budget. As a company or organization increases their social media activity, the role of content engineering becomes ever more important. According to them, content engineering seeks to develop content that better engages targeted users and drives the desired goals of the marketer from the campaigns they implement (Lee, Hosanagar, & Nair, 2015). After reviewing 100,000 messages posted on Facebook by a panel of about 800 firms, they found brand-personality-related content drives social media engagement significantly, while directly informative content tends to drive engagement positively only when combined with such content. They found that directly informative content drives path-to-conversion (click-throughs). It was found that combining both content enables the brand to obtain both the engagement and branding produced by brand personality-related content, as well as the immediate leads produced by directly informative content, along with any additional engagement they produce in combination (Lee, Hosanagar, & Nair, 2015).

Kumar, Bezawada, Rishika, Janakiraman, & Kannan (2016) also examined the effect of advertising content on social media. Their study consisted of those who interacted with the social media pages of a wine and spirts retailer. They measured the customer's participation in the

social media site, and the effect of the promotional and nonpromotional content placed on the retailer's social media. Kumar, Bezawada, Rishika, Janakiraman, & Kannan (2016) found that customers who have a greater motivation to seek information, are more tech savvy, have a greater motivation to socialize online, and use the Internet for online entertainment are more likely to become part of the firm's social media site. The qualitative findings indicated that content on social media plays a major role in consumer behavior (Kumar, Bezawada, Rishika, Janakiraman, & Kannan, 2016).

Social Media and Influence on Purchases

Xie & Lee (2015) conducted a study on the relationship between social media and offline purchases made by consumers who engage in the world of social media. They found that exposures to earned and owned social media activities have significant and positive impacts on households' likelihood to purchase (Xie & Lee, 2015). The study of 1,558 households found that marketing managers should utilize earned and owned social media strategies in conjunction with in-store promotions in order to maximize sales revenue. Xie & Lee (2015) advised that brands be tactful in the way they approach social media because their strategies can make or break offline purchases by consumers (Xie & Lee, 2015).

Rodriguez, Ajjan, & Peterson (2016) also conducted research on the link between social media and a company's sales performance. They found that sales will increase with the use of social media as long as the social media plan is executed correctly. On the other hand, social media interaction will increase if the sales plan is executed correctly (Rodriguez, Ajjan, & Peterson, 2016). Rodriguez, Ajjan, & Peterson (2016) noted that larger companies use popular

social media technology as a way to reach their audiences. The companies realize that if they do not integrate that in their efforts, then their sales and return on investment (ROI) will fall short.

Conceptual Framework

Previous research shows that social media advertising, when implemented successfully, has a great effect on social media users. Successful social media advertising can influence a viewer's psychology and purchasing decisions, which later brings about a decent return on investment. Xie & Lee (2015) proved that a certain apporach to social media can make or break offline purchases made by consumers. All in all, companies must stratgeize properly to not only get their message across fluidly, but also make sure that message brings about wanted results (Xie & Lee, 2015). They believe advertising and promotion has a profound effect on brand purchase, and Figure 1 outlines their theoretical framework.

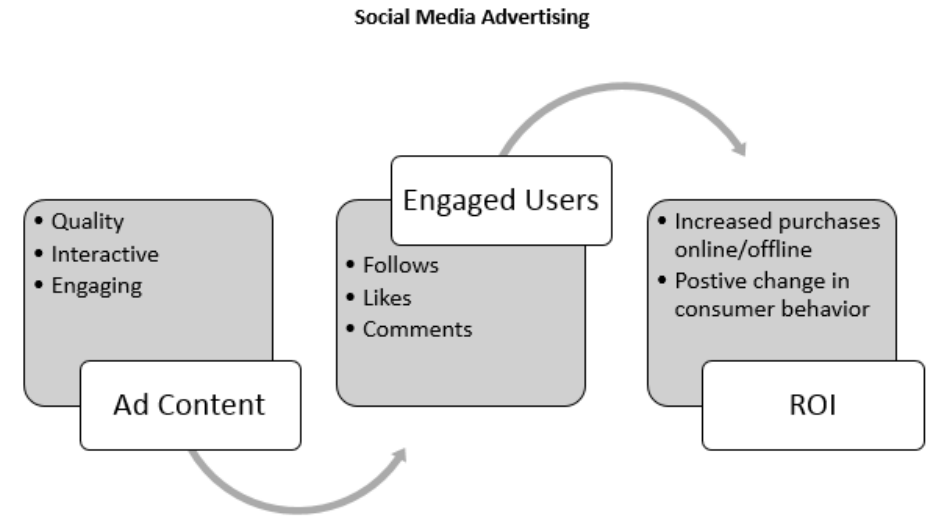

Figure 1. Conceptual Framework

The framework is based on multiple research findings. When assessing social media advertising, one must consider the content first. The content must be of quality, create interaction between

consumers and the brand, and maintain constant engagement. Next, the brand will find that their content has influenced users by a number of factors: follows, likes, and comments. Consumers will respond positively to content that they find engaging, and that is where the relationship between the consumer and the brand is solidified. All in all, the content and engaged users will result in a company's return on investment. Return on investment can be identified by assessing purchases online and offline, as well as monitoring a change in consumer behavior. A positive shift in consumer behavior is a key indicator that ROI has increased.

Hypotheses Development

It has been proven that social media has a positive effect on a company's efforts to advertise. Lim, Lim, & Heinrichs (2014) described social media as playing an increasingly "important role in marketing communication and customer relationship management as it binds various organizational efforts to reach and engage with individuals" (Lee, Hosanagar, & Nair, 2015). They continue to state that "the use of online social media sites by firms has grown dramatically as the firms provide product, service, and brand information on these sites" (Lim, Lim, & Heinrichs, 2014). Social media has proven itself to be a dominant form of communication amongst companies and their target markets and for society as a whole. According to them, "these social media sites have evolved from being a tool solely to facilitate information sharing to being an interactive social tool for communication and collaboration as well as for information and knowledge sharing" (Lee, Hosanagar, & Nair, 2015). Therefore, I propose:

Hypothesis 1: Exposure to social media advertisements have a greater affect than exposure to advertisements on traditional mediums.

Schivinski, Christodoulides, & Dabrowski (2016) conducted a study on consumer engagement in relation to social media content. According to them, “when using social media on a regular basis, consumers come into contact with myriad brands and products by reading, writing, watching, commenting, "Liking," sharing, and so forth” (Schivinski, Christodoulides, & Dabrowski, 2016). It holds true that consumers come across a great deal of content on social media, and it is vital that companies can not only distinguish their content from others, but make sure it is enaging as well. I propose:

Hypothesis 2: Engaging social media content will result in a great return on investment (ROI).

Asghar, Abbasi, & Zafarullah (2015) researched buying behavior in relation to advertisements. According to them, the most influential work done in relation to advertising has been done by Zielske (1959). It was noted that “he presented the theory of recall that explains how frequency of advertisements (schedules) and intensity of messages can affect consumer memory. The theory explains that human mind can retain limited contents and forget quickly, it is therefore advertisers may use repetitive advertisements to start cognitive process” (Asghar, Abbasi, & Zafarullah, 2015). I propose:

Hypothesis 3: Frequencies of advertisements on social media create a positive change in consumer behavior.

Discussions

Social Media Advertisements v. Traditional Media Advertisements

As hypothesized earlier, exposure to social media advertisements have a greater affect than exposure to advertisements on traditional mediums. Social media platforms are constantly being used by companies to showcase what the company is vying to sell and/or promote. Companies such as LG and WedPics are the epitome of companies who have successfully proven that their social media advertisements have generated more reach to their target audience than traditional media.

Figure 1: LG used Instagram to debut their new LG G5 smartphone. Their picture and video advertisements reached over 30 million people across nine countries, which brought over 1.7 million engagements with the brand.

Figure 2: WedPics used Facebook to bring awareness to their wedding photo-sharing app. The company found that over 70% of app installs were from the Facebook advertisement.

Ad Content and ROI

As hypothesized earlier, engaging social media content will result in a great return on investment (ROI). The Orlando Magic and The Golden State Warriors have proven this to be true.

Figure 3: The Orlando Magic used Facebook in order to increase ticket sales during the holidays. Their campaign produced 52x return on ad spend and 84% greater return on ad spend than all other channels.

Figure 4: The Golden State Warriors used Instagram in order to get consumers to purchase official team merchandise. As a result, the company saw a 13.7x return on ad spend from merchandise and tickets in June 2016, and a 14.8x return on ad spend from merchandise and tickets over the 2015–16 season.

Ad Frequency and Consumer Behavior

As hypothesized earlier, frequencies of advertisements on social media create a positive change in consumer behavior. Ultimately, the more an advertisement is viewed, the more likely viewers will consider gravitating towards the brand. Kraft Macaroni & Cheese and Trolli are the epitome of companies who have proved this to be true.

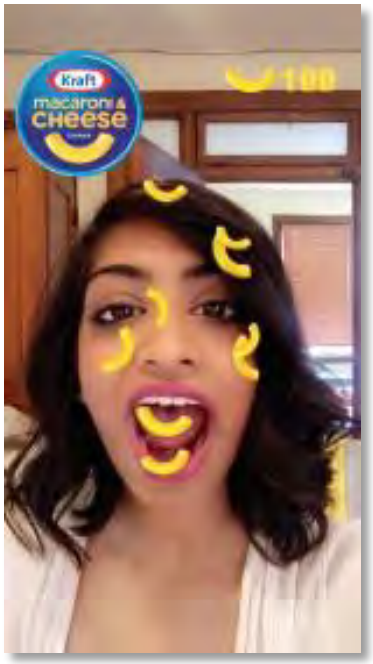

Figure 5: Kraft Macaroni & Cheese partnered with Snapchat and created an interactive advertisement for users. The brand saw an average interaction time of 20 seconds, a 5 pt. increase in brand favorability, and a 13 pt. increase in purchase intent.

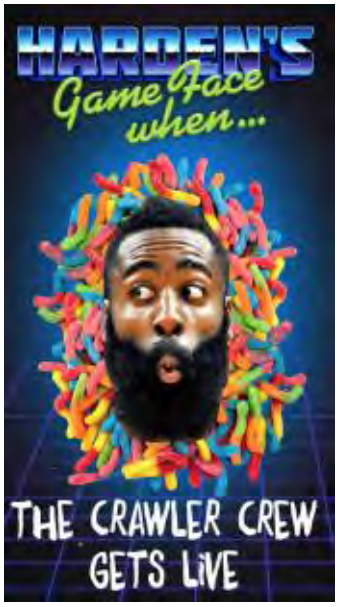

Figure 6: Trolli paired with Snapchat in order to bring awareness to their partnership with basketball star, James Harden. Their campaign consisted of a Snapchat Ad Takeover. It resulted in an 11pt. increase in brand awareness, a 12 pt. increase in brand favorability, and 33% lift in purchase intent.

Conclusion

All in all, social media has proven to be an effective tool for companies. This research has expounded on the use of social media, its relation to effective advertising, and the positive effects it yields. Ad content that is interactive, engaging, and of quality leads can lead to an immense amount of engaged users, which in the end, leads to an increase in return on investment. Companies can expect to see a positive change in consumer behavior after implementing successful advertisements on the right social media. This research suggests that companies spend more time perfecting their advertisement content in order to see wanted results. Future research should analyze how social media advertisements thrive in a particular social media platform, and how those advertisements effect return on investment, brand awareness, and brand engagement. In addition, future research on this area should include quantitative data with consumer attitudes towards social media advertisements.

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THE DOORS ARE CLOSED BUT THE WINDOWS ARE OPENED: A REALISTIC PERSPECTIVE ON DATA SECURITY AND PRIVACY

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ABSTRACT

Information and data security continue to receive their fair share of publicity. Users and owners of these expensive commodities have become more concerned about their confidentiality and privacy. There are even more troubling views that in this epoch, the probability of a business being hacked or an individual's personally identifiable information being leaked is very high. This paper puts into perspective the data security dilemma currently being faced by entities and how to secure data from obvious threats. It presents what is termed by this work as a realistic perspective on today and future security situations. This paper will also set the stage for further research to update the knowledge base on confidentiality and privacy with lifestyle behavioral patterns to data and information security.

INTRODUCTION

The concept that the doors are closed but the windows are opened is meant to put data security into real life perspective. An intruder will not see the gate opened and climb over the fence to get to a property. The intruder will seek to find the easiest way to get access to the property of interest. If left unprotected and the intruder is aware, then valuable possessions can either be stolen or damaged.

Besides, an intruder does not need access to the physical property. There is no need to go into the building or even on the premises. No need to take the laptop, tablet, telephone, or even the computer in order to access the data that reside on them. Everything is connected by either wires or through the wireless spectrum. The latter also increases the risk of data and information being compromised to intruders constantly scanning for data over wireless signals.

It is fair to say that data security has come a very far way over the last decade. So the mechanisms to protect technology assets have advanced significantly. There are advanced algorithms for data encryption, there are more intelligent network equipment such as firewalls, routers, switches to help harden the network, and more security rich wireless access points. Greater data security promised to users of cloud computing, and more advanced and integrated security available in operating systems which make mobile computing more secured. In addition, even social media developers have gone the extra mile to make the social networks more robust and secured by implementing strong encryption technology to protect the confidentiality and privacy of the big data that continue to flow into these data reservoirs. As these advancements continue the reliance on information technology increases exponentially. So do the concerns

about the security of the data and information that travel across the various platforms to make communication and even peoples' lives more effective and efficient.

PROBLEM STATEMENT AND MOTIVATION

Both individuals and businesses are concerned about the privacy of their personally identifiable information (PII) and data. It is becoming the norm where private data and information are hacked and shared without authorization from the owner. Though many solutions exist [2][3] for the protection of confidentiality and privacy, there are still much more that can be done by the individual user.

This paper puts the security context into perspective by focusing on the simple things that need to be done to improve information security. This work is motivated by users who are becoming fearful and need simple solutions written in their own language that they can understand, digest, and take action. The contents of this paper are inspired by individual and business users who desire a simplistic view of information security.

THE SECURITY FRAMEWORK

Data security is not necessarily a simple concept. In fact, this is a complex undertaking. The question, therefore, is how do you keep something that is so complex simple? There is no correct answer to this question. There are many cyber and information security training that are being done at various levels globally in order to develop specialists who can help to reduce the complexity to the user. However, there are still many that find data security a waste of time or inconvenient.

Network, information and data security have been widely researched and published. What we know today is that it is much more difficult to break into business networks that have rigid technology related security practices. The datacenter in most entities are already secured. There are firewalls, routers, antimalware, antivirus, hardened operating systems, strong physical security, access controls, frequent information technology audits, and many other safeguards. So the complex side of the information security infrastructure has been somewhat fixed. The door is synonymous to the complex side of the infrastructure security. The door represents the stronger and harder side of the information and data security supply chain.

Securing the enterprise and the cloud would be easy if all that was required is to close the doors. Businesses are now running critical systems across global enterprises and in the cloud. Finance, Human Resource, Customer Relationship Management (CRM), and other enterprise resource planning systems are deployed across large enterprises and in the cloud. These systems are usually relatively safe because of the advanced security controls that are used to safeguard them. Oftentimes, however, there are little controls that may not be considered complex, but can compromise the security of these systems regardless of how strong the security is. If you have the keys to enter your house and you made a copy for a best friend who then gave a copy to an

unreliable friend. The security on the house may be great, but someone now has the keys that change all of that and compromise the security. Therefore, the behavior of the users can reduce the effectiveness of strong security controls.

Another scenario to consider when thinking about information security is that we may have strong network and infrastructure security, but there are environmental issues that make the resultant effect of such security controls ineffective. This simulates the concept where the doors are closed but the windows are opened. So a cloud vendor may not want to put a datacenter in the middle of the Caribbean Sea or at a location close to the ocean or an area historically known for flooding. No matter how strong the encryption to protect data at rest, data in transit or to secure the network infrastructure, there are inherent weaknesses brought about by the environment. So in assessing the security of the data, network and overall infrastructure, consideration must be given to these areas that seem insignificant.

REALISTIC DATA SECURITY

A realistic perspective of data and infrastructure security means that common sense, reasonable, practical or good judgement is applied to how the confidentiality and privacy of information and data are protected. Many users have hardened network infrastructures through the capabilities provided by advanced computing and networking. Though this closes the doors, this alone does not protect the privacy of PII, for example. The vulnerabilities exist in the behavior and daily practice of the user, which is similar to leaving the windows opened while the doors are closed. Common sense and realistic behaviors to data security must be addressed by both the individual user and the entity that employs the user. This section highlights some of these realistic behaviors that can be implemented with very little cost to close the insecure windows.

Security Awareness and Training

Awareness can change the security landscape of many users of computing technologies. Understanding the broad impact that a security breach can have on the business or personal life of the user could change behaviors. Companies need to share the results of business impact analyses (BIA) with their staff. This includes risk assessment results so that users can understand the risks involve in not adhering to good data security practice and behavior. The open window to a security breach could be the weak link in how a user treats security while executing business transactions. Therefore, data security awareness training needs to be a high priority activity for business entities today. This hinges on the bottom line of the business and could determine its ability to survive in this information era.

Lifestyle Behavior for Data and Information Security

It is also imperative for individuals to stay abreast of the technology developments and security issues in society on a whole. Social networking has become a way of life today. Many individuals use Facebook, Twitter, Instagram, and WhatsApp to communicate and share their

lives with friends and others in their social net. Individual users, therefore, need to make it their responsibility to read more, keep up-to-date, and inform themselves of what is happening in the information world. Knowledge is the key to this realistic and practical view in order to close those insecure windows. Intruders are not necessarily looking at entering through the doors anymore. Instead they are looking for the little things that are neglected. They are looking for that user who left the windows insecured or opened.

Individuals must practice sensible use of data and information – take care in how or what is communicated over the internet, telephone, and social media and keep PIIs safe at all times. Accordingly, 79% of users who utilize android devices agree that confidentiality and privacy are their main concern [1]. This creates a huge problem for business users as more of these devices are deployed in the work place. Everyone needs to adjust their behavior and become more security conscious. Data and information security may need to become a lifestyle behavior in order to benefit from the complex security that has been configured under the hood. The security decisions that are made today will continue through the lifecycle.

CONCLUSION

Both business and individual users of information technology need to accept the realization that this is the information era. The greatest and most valuable assets to both companies and individuals are their information and data. Espionage within a company can be catastrophic in the same way identity theft can be disastrous for the individual user. The configuration of network and infrastructure security have hardened and somewhat closed the complex security loopholes and doors for many organizations and individuals. It is now incumbent on both entities to take the next step to start the behavioral lifestyle change for data and information security in order to close the windows that are now the entrance to the data infrastructure. Consequently, future development of this concept will derive a model that business and individual users may utilize to guide them in making this lifestyle change to information security.

It may also be valuable to conduct research based on lifestyle attributes to data security. This research will be useful to both the individual and business users. It may also be used to update the confidentiality and privacy knowledge base with behavioral patterns to data security.

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The Effect of Nonlinear Inventory Turnover Ratio on Inventory Management Efficiency

This study examines the effect of nonlinear inventory turnover ratio on the inventory-performance relationship. The inventory turnover ratio is measured by the ratio between inventory and sales. The existing studies on the inventory–performance relationship assumed a linear relationship between inventory and sales: as firm's sales increases, the quantity of inventory should also increase proportionately. The assumption, however, conflicts with the optimal inventory policy based on the economic order quantity model. As such, the linear inventory turnover ratio fails to recognize the fundamental inventory cost tradeoffs and cannot be considered as a good indicator of efficiency in inventory management. Assuming inventory turnover ratios are nonlinear, a few recent studies examined the inventory–performance relationship and reported conflicting results with the existing studies. In this study, we examine the nonlinear relationship between inventory and sales at the firm-specific level, using the panel data of U.S. manufacturing firms over the period of 1980–2014 collected from the Compustat database. Our results show that neither of the assumptions was prevailed over the sample period.

The Effects of Anthropomorphic Advertising

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Abstract:

This research focuses on Anthropomorphism as it relates to consumer advertising. When using anthropomorphic advertising, it important for companies to know and understand how it will effect consumers and consumer purchasing habits. This research discusses how anthropomorphic advertisements appeal to consumers' emotions. This research will also discuss both the positive and negative effects of anthropomorphic advertising and how consumers perceive and receive anthropomorphic messages. Consumers may or may not trust anthropomorphic advertisements. These effects vary by age, culture, and product. This study addresses the following questions:

- What is anthropomorphism?
- How does anthropomorphic advertising appeal to consumers' emotions?
- Will anthropomorphic advertising have a positive or negative effect on consumers? Why?
- Do consumers trust anthropomorphic advertisements? Why or Why not?
- How does age, culture, and product differentiation effect anthropomorphic advertising appeals?
- How do companies use anthropomorphic appeals for Branding?

This research answers the questions above and spread knowledge and understanding about the effects of anthropomorphic advertising on consumers.

Keywords: Anthropomorphism, Emotional Appeal, Positive effects, Negative effects, Trust, Branding

Introduction

Imagine watching your favorite cartoon when you were younger. A talking and lively dog, car, or house appeared on your television screen. This object would walk, talk, sing, and dance just as a human being. The object appealed to your emotions and without you realizing it, you were being persuaded to stay tuned by an anthropomorphic object. Anthropomorphism is defined as the attribution of human traits and emotions given to non-human entities[1]. For

[1] https://www.ideasforleaders.com/ideas/why-anthropomorphism-works-in-marketing

example, giving a chair a facial structure or an animal a human voice. This is known as anthropomorphism because these objects or entities would not normally have these human qualities.

The term, “Anthropomorphism” was created in the mid-1700s but the concept has ancient roots, and was believed to have started through storytelling and artistic mediums. The term derives from the combination of the Greek (*ánthrōpos*), "human" and (*morphē*), "shape" or "form"[2]. The word technically means” in human form”. For centuries, entities have been attributed by human emotions and behavioral traits. These attributes can be seen in history through a medium of religion, mythology, fairy tales, fables, and literature.

Anthropomorphism is heavily used in marketing to attribute human emotions to products or services. The product has the power to make consumers feel a certain emotion way by associating powerful human emotions to appeal to the consumer. Anthropomorphic ads can command consumers to feel compelled to buy a product or service. Although this marketing tool can be effective, it can also be ineffective as well. Even though anthropomorphic advertising can have a positive effect on consumers, this strategy can have a negative effect as well. This is when the “Trust factor” comes in to play. Some consumers may not be of anthropomorphic advertising. They may think that an anthropomorphic product or advertising campaign is unbelievable or untrustworthy. It is important for researchers to understand how anthropomorphic products or anthropomorphic advertising campaigns will effect consumers and their decision to purchase a product or service.

[2] https://www.ideasforleaders.com/ideas/why-anthropomorphism-works-in-marketing

If consumers do not trust anthropomorphic advertisements, companies must first understand why. There are many factors that lead determine whether anthropomorphic advertising will be appropriate and whether this choice of strategy will have a positive or negative effect on the consumer. Companies should consider factors such as, age, culture, gender, and product or service offered.

It is important for companies to understand the best strategy when trying to market to their consumers. Although anthropomorphic advertising can be very effective, sometimes it is not the best strategy to use. This research will show the positive and negative effects and feedback from using anthropomorphic advertising and how it effects consumers and potential customers in a given market.

Literature Review

Anthropomorphism is the way toward appointing genuine or envisioned human qualities, goals, inspirations, or feelings to non-human objects. All through civilization, individuals have pervaded animals from the normal world with human qualities and inspirations. Advertisers have profited by this propensity by making an assortment of human creature mascots for business items and administrations, for example Kellogg's Tony the Tiger. There are likewise various non-human creature mascots too (the charging bulls on the Red Bull name being one). The goal of this research is to add to the literary works of anthropomorphism and creature symbolism by analyzing how reactions toward depictions of creatures in commercial center circumstances are influenced by humanoid attribution. Since individuals tend to think about the world as far as the human experience, and have a tendency to be drawn toward things that are more like themselves,

this examination looks at the part of saw creature closeness to people (Delbaere, McQuarrie, & Phillips, 2011).

The study tests reactions to visual human depictions of creatures in light of their benchmark physical likeness to people. The exploration theorized that individuals will react all the more positively to human depictions of creatures when there is a higher benchmark physical comparability to people, yet will react all the more positively to non-human depictions of creatures with a lower standard similitude to people.

Discoveries from this examination show that a creature's pattern physical closeness to people is to be sure an essential determinant of how individuals respond to it. In an exploratory study, members who saw a creature lower in standard physical likeness to people had more constructive assessments of the creature picture when it was introduced non-similar to a human. Conversely, members who saw a creature higher in gauge physical likeness to people had more constructive assessments of the creature picture when it was displayed similar to a human. In this way, while both human and non-human creatures symbolize the commercial center, this exploration uncovers that there are critical limit conditions that influence whether anthropomorphism is prone to bring about more positive responses to creature symbolism (Bülbül, & Menon, 2010).

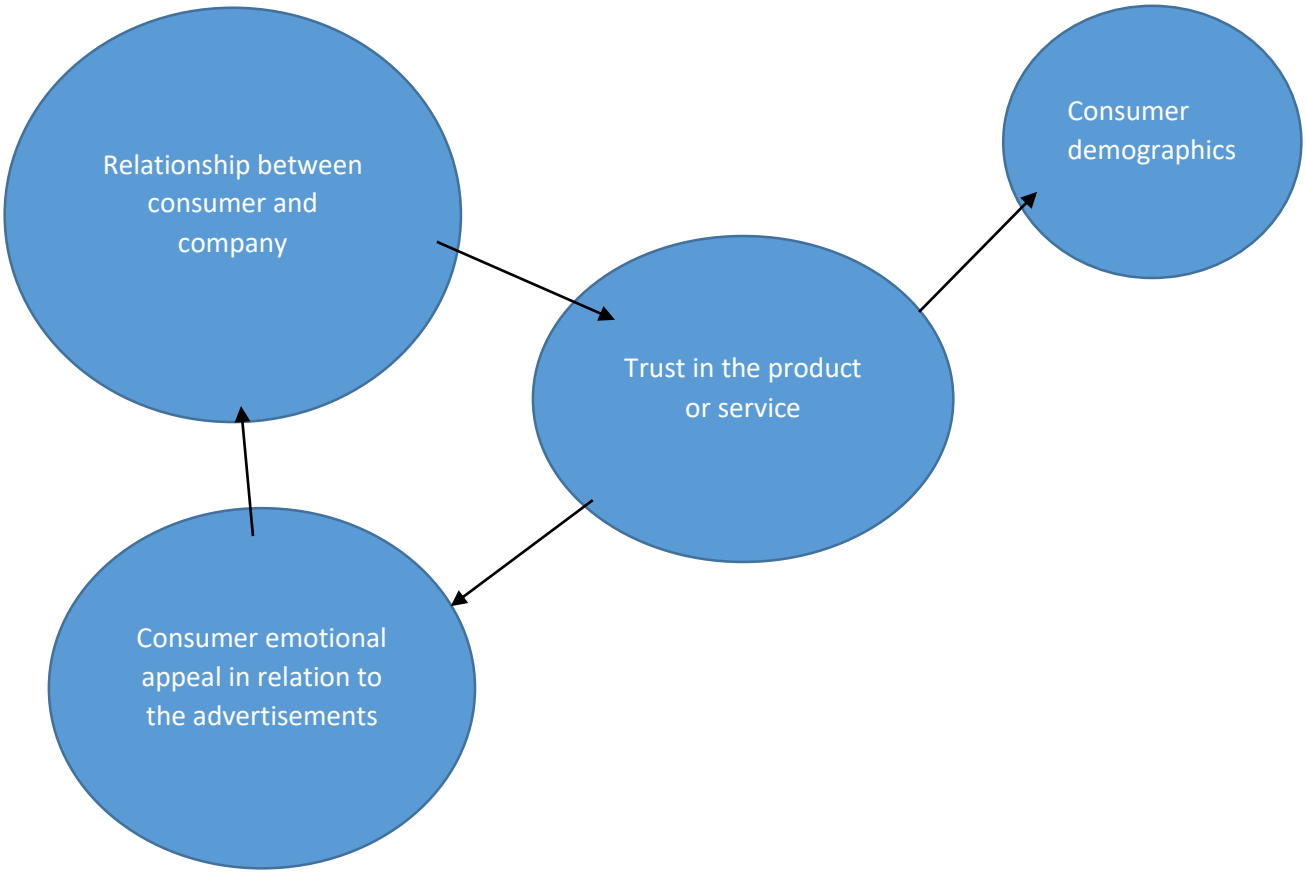
In spite of the fact that advertisers have since quite a while ago utilized anthropomorphism broadly to make mindfulness or to keep up a social association and belongingness. Specialists on buyer reactions to the webpage, and the brand highlighted on the website. They found that the appearance (versus nonappearance) of a human object on a business website had a noteworthy positive effect on purchasers' demeanors toward the company’s

product, and had least impact on states of mind toward the brand. They likewise showed that two mental results of seeing the human operator as a genuine individual are expanded seen believability of the company more prominent experienced a positive outcome. In spite of the study, it does not straightforwardly deliver to purchaser's attitude toward the convenience of human representations, for example, talking items on the racks by offering a natural interface to administrations that bolster clients, e.g. in shopping centers to finish their shopping errands (Delbaere, McQuarrie, & Phillips, 2011).

Anthropomorphism is not only used in advertisements; it is also used for branding. Most times when a company develops its brand, it attaches human attributes. This opens up a channel for consumers to create a personal connection with the company or the product or service it is offering. By humanizing the brand, it creates a stronger bond between the self and the consumer. Human qualities are easier to relate to. Many companies have had huge success in relation to anthropomorphic branding. Tom's sells millions of shoes every year by attaching a human experience of helping others. Customers are both fulfilling personal wants and helping the needs of others. Tom's customers are enjoying supporting the company by sporting stylish new kicks. They feel great about doing a "good deed". Overall, Tom's has received great feedback from using this anthropomorphic marketing strategy.

Conceptual Model

Figure 1 highlights factors that affect consumer attitude in anthropomorphic advertising.



Model Overview:

This conceptual model indicates that different factors can help establish a positive or negative relationship between the consumer and company.

Hypothesis 1: The relationship between the company and consumer has a direct effect on the consumer's trust in a product or service. The company will always benefit if they have a postive relationship.

Hypothesis 2: Arrousal of the consumer's emotional appeal will help determine the relationship between the company and consumer.

Hypothesis 3: Consumer demographics will determine if there is a strong relationship between the consumer and the company.

Discussions

Research shows that most anthropomorphic advertsing appeals to consumers. Consumers are more likely to belive in a personified object than a live human being. This concepts dervies from trust-based selling. In order for a consumer to believe in a product, thr customer must have trust that the product will live up to it's expectations. Human beings find more comfort in material items than other human beings. It is hard for human beings to trust other human messengers beacause they believe that the human messenger will be untruthul. Humans have the tendecy to lie or decieve. Consumers think that if a human is delievering the advertising message, something about the message will be untruthful. Studies show that 7 out of 10 consumers prefer a anthropomorhic messenger than a human one (Bülbül, & Menon, 2010). Creating a spokes person also helps with brand-protection. There is a resistance to negative information if a company creates a character rather than using a human spokesperson. The character is always able to spread recogition, positive brand attittude and repetitiveness. When Geico uses a geieko for advertsing, it appeals to consumer emotions. The geico spreads postive brand awareness because it is extremely hard for the geiko to have a bad reputation. Geico makes

the animal humorous, likeable and intelligent. Most consumers respond positive to the human like creature while choosing to save on their car insurance.

Each individual has his or her own particular by and by saw personality. Known as the self-idea in brain research, it depends on an individual assessment of remarkable properties and characteristics. Mark distinguishing proof is "a social development that includes the mix of saw brand character into self-personality". This happens when a buyer has a reliably constructive involvement with a brand and finds a likeness in their own picture and the brand's picture . When mark ID happens, the brand turns into a representation of the buyer's self-idea. This prompts to solid connection to the typical brand, and also its related items. Connection is essential since it mirrors the buyer and brand's shared mentalities and convictions.

Believeing and trusting in anthropormorphic ads is also based off of demographics. Younger consumers will trust anthropormorphic Ads before older consumers. Consumers around the age 40 or above appealed more to human messengers. This is because the consumers over 40 were purchasing products based off of reviews and facts. Consumers over 40 are brand loyal and will rather get quality over quantitiy. Consumers over 40 want to know what the product has to offer and are unlikely to be persuaded by gimics. Younger consumers (under 40) want the product or service they are purchasing to appeal to their emotions. They will purchase the product on how they beileve it will make them look or feel (Delbaere, McQuarrie, & Phillips, 2011).

Income is also an important factor when it comes to anthropormorphic advertising. Consumers with lower incomes are more likely to believe and trust in anthropomorphic advertising. The lower income reflects the ammount of security the consumer has. Consumers with low fnancial security appeal to ads that will not have any huma beings. This is because those consumers find it hard to trust other humans. They do not want to believe or put their trust

in the human spokes person. Medicene Ads who use human beings as the spokes person have a tendecy to do poor in sales. Most of the consumers who purchase the product, will purchase because of pure need and not pursuasion (Touré-Tillery, & McGill, 2015).

Certain products do well with anthropomorphic advertising, while others do not. It is important for companies to understand this before they choose to advertise to consumers. Nike choses to use human spokespeople for advertising instead of personified objects. This concept does great for Nike. It is better for another human being to tell the cosumer how great their product is than an unreal object. For example, consumers are more likely to belive the pro-athlete than a cartoon wearing shoes. It is important for comapany's to realize if it is credible for a anthromorphic object to deliver the message or a human being and regular object (Bülbül, & Menon, 2010).

At the point when a business builds up its image, it more often than not joins human qualities. The one-for-one shoe brand TOMS, submitted itself to the human experience of helping other people. By purchasing TOMS shoes, the shopper is satisfying an individual need, as well as mindful that some place on the planet a man in need will profit by their buy too. In this way, purchasing TOMS is not an expansion or by-result of our consumerism culture, it is a kind deed. It helped purchasers conquer the blame of purchasing another match of shoes in a retreat ridden economy and gave activity a more prominent reason by permitting customers to join magnanimity into their selflessness by helping someone else (Calabro, 2014).

Case Study

This study was used to find the relationship between brand identity characteristics, the utilization of spokescharacters and perference by leading an online overview. Elon University understudies, 211 understudies between the ages of 18 and 22 years of age, were chosen as an

accommodation test gather, and the brand factors were chosen from body wash and brew brands given the high recurrence of utilization and buy by the overview's example demographic. Old Spice and Dove Men+Care spoke to the body wash class, and Corona and Dos Equis spoke to the brew classification. Old spice was confident and sexy. Dove+ Men Care was caring and protective. Dos Equis was mysterious and interesting (Calabro, 2014).

Beginning investigation of the quality results would propose that Dove Men+Care body wash (27%) would be favored over Old Spice (22%); and Corona (33%) over Dos Equis (17%). Be that as it may, the inverse ended up being valid in the study. Old Spice collected critical preference over Dove. A similar marvel was seen between their inclination for Corona or Dos Equis. This fortifies the discoveries of the writing survey that humanizing brands into spokescharacters is powerful at making positive brand mentalities. Despite the fact that respondents picked one sort of characteristics as perfect, the nearness of a spokescharacter permitted the purchasers to all the more effortlessly relate to the brand with various types of qualities. The simplicity of recognizable proof of the brand's identity through the spokescharacter let Old Spice fundamentally beat the five-rate point lead Dove Men+Care's identity qualities had (Calabro, 2014).

Conclusion

It is important for businesses to consider many things when choosing to use anthropomorphism in advertising. The sucesss of anthropormorphic advertising depends on the message that needs to be coveyed and the audience that message will be delivered to. Demographics such as, age, income, and culture are all important factors. The older the customer, anthropormorhism is not the best option. The higher the income that the consumer

makes, anthropomorhism is least likely the best option. Certain products do well with personified brands while others do not. The Company must first decide whar message they want to get across to the consumer before picking how and who is bets to deliever the message. Businesses must research their targeted customer to see if anthropomorphisim is the best option. Consumers will not feel comfortable purchasing a product if they do not trust the spokesperson. If a business wants to truly be succesful they must balance emoional appeals with customer satisfaction to make sure that they are reaching the consumer through advertsiements.

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THE IMPACT OF INFORMATION MANAGEMENT AND RELATIONSHIP QUALITY ON HEALTHCARE INDUSTRIAL VENDING MACHINE IMPLEMENTATION AND USE: A PRELIMINARY EMPIRICAL ANALYSIS

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ABSTRACT

Healthcare organizations face considerable pressure and challenges in efficiently and effectively managing their supply chain operations. Although slow to change, the healthcare industry has begun to consider alternative inventory management systems in order to improve inventory control and patient care. Industrial vending machines (IVM) represent a specific form of vendor-managed inventory (VMI) that can help healthcare organizations address different inventory management issues. The purpose of this research is to develop and test a model that highlights the critical role of information management in the link between relationship quality and different outcomes of IVM implementation and use in the healthcare sector. A theoretical model is proposed to explore the relationship between information management, relationship quality and different healthcare IVM benefits. Structural equation modeling and survey data from over 100 healthcare supply chain managers are used to test the research hypotheses. Empirically tested results grounded in TCE and contingency theory confirm the relationships between different healthcare IVM enablers and outcomes. More specifically, findings suggest that the successful implementation and use of IVM is tied to both information management as well as the quality of the relationship between vendors and healthcare organizations. Results also indicate that the information that is shared between healthcare supply chain partners mediates the relationship between relationship quality and various healthcare cost, service and inventory benefits. The findings presented in this study provide healthcare supply chain managers with current findings, which should aid them in evaluating IVM solutions.

Keywords: Empirical studies, healthcare, supply chain management, inventory management

INTRODUCTION

Best practices in supply chain management (SCM) often focus on the strategy of balancing efficiency and effectiveness to improve competitiveness and performance [1]. Nowhere is this struggle more acute than in the healthcare industry, where managers face unique challenges and conflicting goals to simultaneously control costs and ensure exceedingly high patient care, or risk the nearly immeasurable cost of lost life [2].

Challenges notwithstanding, healthcare supply chain managers are under intense pressure to balance efficiency and effectiveness, particularly in the area of inventory management [3, 4]. Recent evidence indicates healthcare organizations have begun to implement changes to their inventory management systems. For example, healthcare supply chain managers have started adopting vendor managed inventory (VMI) agreements in the form of industrial vending machines (IVM), which are commonly referred to as automated drug and medical supply dispensing systems (e.g., Pyxis inventory systems) [5, 6]. These changes represent a significant step, given the industry's historical rigidity to implement new operational initiatives [4].

While the implementation of IVM agreements signals a change in the way the healthcare industry uses and prioritizes inventory management, theoretical research focused on healthcare inventory management issues remains nascent and fragmented despite the calls for a deeper understanding of SCM in the healthcare sector [2, 7-9]. The purpose of this research is to develop and test a model that highlights the role of information management in the link between relationship quality and different outcomes of IVM implementation and use in the healthcare industry. To address this research objective, we propose and empirically test a modified version of the VMI model developed by Claassen, Van Weele [10] grounded in two theories, transaction

cost economics (TCE) and contingency theory. The findings presented in this study represent a path to further understanding the role of SCM in the healthcare sector.

The study is organized as follows: The next sections describe and integrate the theories and the relevant literature into a theoretical model of healthcare IVM. The authors then present the methodology and results sections. The last two sections discuss a series of managerial implications, limitations and directions for future research.

THEORETICAL BACKGROUND

Transaction Cost Economics and Contingency Theory

TCE represents a complex economic theory stemming from the work of Commons [11], Coase [12] and Williamson [13], among others. TCE helps explain why firms perform some activities internally, while other activities are sourced externally to the market. Underlying these decisions is the TCE tenet that there is a cost associated with all business transactions that must be accounted for and minimized while balancing the risks associated with the transactions' outcome(s) [14]. A number of assumptions underlie TCE. The two most applicable to this research are *bounded rationality*, which suggests decision makers are limited in their abilities because of their bounds of knowledge, and *opportunism*, where decision makers act in their own best self-interest, and assume others will do the same [15]. TCE has been successfully used to study different supply chain management topics [16, 17].

Contingency theory complements TCE by extending TCE's efficiency-driven emphasis to include considerations related to the impact of environmental factors on organizational structure, strategic decision making, and efficiency and effectiveness-driven performance criteria [18]. Contingency theory suggests that firms will focus internal resources and competencies in

order to develop a strategic *contingent* response to the changing environmental variables in order to remain competitive [2]. This theory has been used in the SCM literature to examine the relationship between supply chain fit and firm performance [19], as well as the fit between external environmental variables and internal strategy to improve hospital performance [2].

TCE and contingency theory combined can be used to investigate the enablers and outcomes that influence healthcare supply chain managers' perceptions toward the adoption and use of IVM solutions. While TCE represents a more operational, transaction-based theory, contingency theory can be used to explain the contingent reactions of managers in industries characterized by status-quo and rigidity, such as the healthcare sector.

Inventory management in the healthcare industry

Healthcare supply chain managers struggle to accurately forecast inventories due to the rapid rate of change in regulations and technology, as well as the difficulty in predicting patient mix [8, 20]. This demand uncertainty forces managers to carry a wide variety of both routine (e.g., examination gloves) and critical (e.g., narcotics) inventory items. Holding these items in excess creates inefficiencies and drives higher costs while not always adding customer value [3, 21]. Stock-out situations, on the other hand, can endanger patient care and force hospitals to maintain excess levels of safety stock [3].

Collaborative relationships and vendor managed inventory

The adoption of collaborative SCM strategies by healthcare organizations can help mitigate the effects of inventory management problems [3, 22]. Collaborative relationships involve the sharing of critical resources such as information, technology and expertise, and can help create

competitive advantage as well as improve profit performance [23]. Collaborative initiatives in the context of healthcare supply chains have shown to improve hospital-supplier integration [8] and information flows [22].

VMI represents a collaborative strategy used to optimize inventory availability at the most efficient cost for both buyers and suppliers [24]. In the case of VMI initiatives, a supplier is given access to demand information and, in exchange, takes full responsibility for managing the inventory of certain agreed upon products [25]. A key aspect of VMI success is that suppliers are responsible for monitoring the buyer's inventory levels and for developing replenishment plans for the customer based on actual usage patterns [26].

While the use of VMI is not widespread in the healthcare industry, these type of agreements have been shown to improve supply chain performance through decreased stock-outs and higher service levels [27] as well as reduced costs and inventory levels [28].

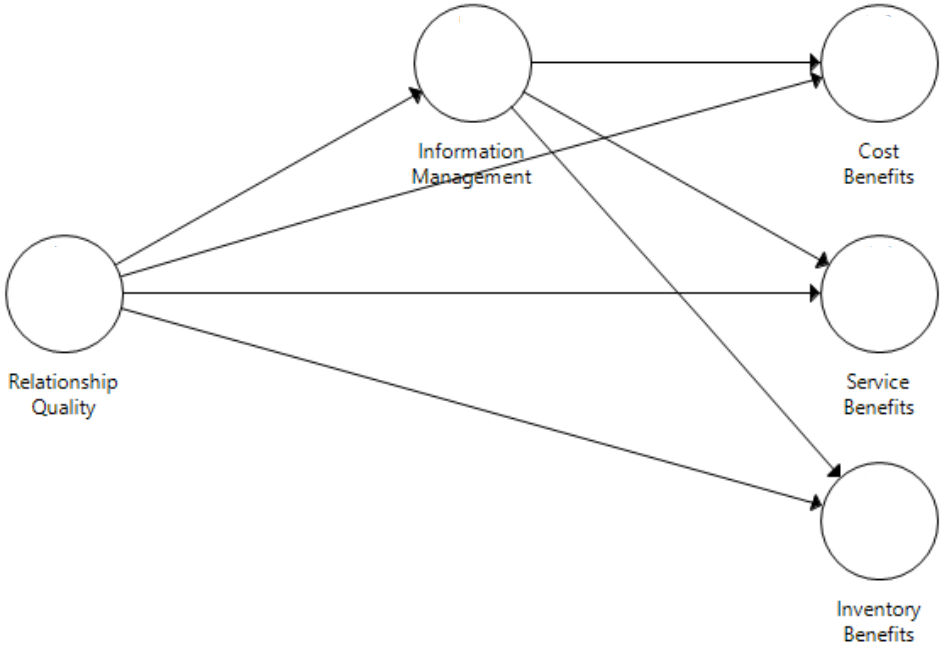
IVM solutions are considered a specific form of VMI because they represent collaborative partnerships that allow a supplier access to the buyer' place of business, involve the use of real-time information, and require the implementation of inventory control mechanisms in order to maintain inventory replenishment schedules [20].

THEORETICAL MODEL

This research adapts a series of enablers and outcomes of perceived success from Claassen, Van Weele [10] because of their relationship to VMI initiatives and agreements, as identified in the literature (e.g., Angulo, Nachtmann [24], Waller, Johnson [26], Dong and Xu [29], Fawcett, Waller [30], Vigtil [31]). The theoretical model links two antecedents (*relationship quality* and *information management*) to three healthcare IVM outcomes (*cost benefits, service benefits* and

inventory benefits). In the proposed framework, *information management* acts as a mediator between *relationship quality* and the outcomes of healthcare IVM implementation and use. Size of organization (procurement spend), number of machines and machine ownership (own versus lease) are included in the model as control variables. The proposed model is presented in Figure 1.

FIGURE 1
Theoretical model



Based on the review of the literature and the theoretical model displayed in Figure 1, the following hypotheses are proposed.

H1a. Relationship quality directly and positively contributes to healthcare IVM cost benefits.

H1b. Relationship quality directly and positively contributes to healthcare IVM service benefits.

H1c. Relationship quality directly and positively contributes to healthcare IVM inventory benefits.

H2a. Information management positively contributes to healthcare IVM cost benefits.

H2b. Information management positively contributes to healthcare IVM service benefits.

H2c. Information management positively contributes to healthcare IVM inventory benefits.

H3a. Relationship quality indirectly and positively contributes to healthcare IVM cost benefits via information management.

H3b. Relationship quality indirectly and positively contributes to IVM healthcare service benefits via information management.

H3c. Relationship quality indirectly and positively contributes to IVM healthcare inventory benefits via information management.

METHODOLOGY

Survey development and data collection

An online survey was developed to test the research hypotheses. The constructs were operationalized and measured using items adapted from Claassen, Van Weele [10]. The different survey items tap perceptual measures of manager's opinions, which have been shown to satisfy the requirements of reliability and validity in construct measurement [32]. All items included in the proposed model (Refer to Table I) utilized a seven-point Likert type scale ranging from 1 (not at all) to 7 (very much).

The target population consisted of healthcare supply chain managers. Contacts were obtained via the Association for Healthcare Resource and Materials Management (AHRMM)

and the Council for Supply chain Management Professionals (CSCMP). A total of 130 usable responses were obtained. Non-response bias was assessed by comparing early versus late respondents and deemed to not be a threat to the integrity of the data.

Data analysis

The proposed model was assessed using the SmartPLS software package and the sample of healthcare IVM users. Descriptive statistics for all constructs are presented in Table I.

TABLE I
Constructs' descriptive statistics and survey items

Construct/Items	Mean	Std. Dev.
Relationship Quality (RQ)	***5.44***	***1.03***
1. Compared to the ideal situation, we are satisfied with our supplier's performance.		
2. Our view of this relationship conforms with this supplier's view of the relationship.		
3. We are convinced that this supplier will live up to all deals and agreements.		
4. We can count on this supplier when it comes to important needs and requirements.		
Information Management (IM)	***5.71***	***1.11***
1. The information that the machine(s) provides is adequate.		
2. The information that the machine(s) provides is reliable.		
3. The machine(s) enables us to access actual usage data.		
4. The machine(s) enables us to operate more efficiently.		
5. The machine(s) enables us to respond to changes more quickly.		
Cost Benefits (CB)	***5.60***	***1.19***
1. The machine(s) has helped us reduce our emergency action costs.		
2. The machine(s) has helped us reduce our hoarding and pilferage costs.		
3. The machine(s) has helped us reduce our stock-out costs.		
4. The machine(s) has helped us reduce our total inventory costs.		
Service Benefits (SB)	***5.14***	***1.28***
1. The machine(s) has helped our supplier be more responsive to our needs.		
2. The machine(s) has helped our supplier provide higher levels of service.		
3. The machine(s) has helped make our supply chain more flexible.		
4. The machine(s) has helped make our supply chain more efficient.		
Inventory Benefits (IB)	***5.69***	***1.32***
1. The machine(s) has helped us improve our inventory availability.		
2. The machine(s) has helped us improve our inventory count accuracy.		
3. The machine(s) has helped us improve our forecasting accuracy.		
4. The machine(s) has helped us reduce our inventory levels.		

The assessment of the measurement model included an analysis of the constructs' internal consistency, the individual indicators' reliability, and the constructs' convergent validity. Cronbach's Alpha and Composite Reliability estimates were calculated for all constructs to evaluate their internal consistency reliability. The resulting estimates are displayed in Table II.

All estimates exceed the 0.70 cutoff recommended by Nunnally [33], indicating adequate internal consistency for the five constructs.

TABLE II
Construct reliability and validity

Construct	α	CR	AVE
RQ	0.90	0.93	0.77
IM	0.91	0.94	0.74
CB	0.90	0.93	0.78
SB	0.94	0.95	0.84
IB	0.93	0.95	0.82

To establish convergent validity at the construct level, Average Variance Extracted (AVE) estimates were calculated for the five constructs (Refer to Table II). The resulting AVE values indicated that each construct explained more than half of the variance of their indicators. These estimates therefore suggest adequate convergent validity across all constructs.

The assessment of the measurement model also included an examination of the constructs' discriminant validity. The Fornell-Larcker criterion [34] was used to determine whether the constructs met the conditions for discriminant validity. As shown in Table III below, the square roots of the AVEs for the five constructs were higher than the correlations of those constructs with the other latent variables in the model. The results therefore suggest that all constructs represent valid measures of unique concepts.

TABLE III
Discriminant validity

Construct	RQ	IM	CB	SB	IB
RQ	**0.88**				
IM	0.72	**0.86**			
CB	0.56	0.78	**0.88**		
SB	0.67	0.74	0.80	**0.92**	
IB	0.61	0.84	0.76	0.69	**0.91**

Note: Square root of the AVE on diagonal in bold.

RESULTS

Hypotheses Testing

The research hypotheses were simultaneously tested using SmartPLS. A summary of the hypotheses testing is displayed in Table IV. As previously explained, size of organization, number of machines and machine ownership were included as control variables in the model. However, the impacts of the controls on the outcome variables were not significant at the 0.05 level.

TABLE IV
Summary of hypotheses testing

Path	St. Weights
RQ → CB	0.00
RQ → SB	0.29*
RQ → IB	0.02
IM → CB	0.78***
IM → SB	0.55***
IM → IB	0.82***
RQ → IM → CB	0.56***
RQ → IM → SB	0.39***
RQ → IM → IB	0.59***

Notes: * $p < 0.05$, *** $p < 0.001$

Relationship quality was found to have an insignificant direct effect on healthcare IVM cost and inventory benefits. However, the results suggest that relationship quality had a significant indirect positive effect on those two outcome variables via information management. Thus, while the findings did not provide support for H1a and H1c, H3a and H3c were supported at the 0.001 level of significance.

With respect to service benefits, relationship quality was found to have significant direct and indirect effects on healthcare IVM service benefits. The findings thus provided support for both H1b and H3b. Results also indicated that IVM information management had a significant positive effect on the three types of IVM benefits. Consequently, H2a, H2b and H2c were all supported at the 0.001 level of significance.

Overall, findings suggest that the successful implementation and use of IVM is tied to both information management as well as the quality of the relationship between vendors and healthcare organizations.

Mediation Analyses

The critical role of information management in the link between relationship quality and the different IVM benefits was analyzed next. Table V displays the results of this portion of the analysis.

TABLE V
Summary of mediation analyses

Effect	Variance Accounted For	Conclusion
RQ → CB	99%	Full Mediation
RQ → SB	58%	Partial Mediation
RQ → IB	97%	Full Mediation

The results show that information management fully mediates the relationship between relationship quality and both cost as well as inventory benefits, while the effect of relationship quality on IVM service benefits is partially mediated. Empirical findings thus confirm the mediating role of information management, suggesting that the information that is shared between healthcare supply chain partners explains most of the effect of relationship quality on the different IVM benefits (VAF values ranging between 58% and 99%, as shown in Table V).

DISCUSSION

Efficient and effective practices in healthcare organizations are considered critical to improving performance [35]. Prioritization of inventory management among healthcare organizations continues to lag behind other industries, as managers continue to move cautiously forward in adopting new solutions. The findings presented in this study help address some of these issues by examining the relationship between a series of enablers and outcomes of IVM implementation and use in the healthcare industry.

This study has relevant implications for supply chain managers in healthcare organizations. For managers who have not yet considered healthcare IVM, the study results can help supply chain managers make better informed decisions related to the allocation of resources to achieve greater control of their operation, reduce the risks associated with the uncertainty and complexities of the healthcare industry and, at the same time, improve performance. Indeed, 90% of respondents reported that healthcare IVM were cost effective within two years.

Another relevant takeaway for healthcare supply chain managers is understanding that both the quality of the relationship as well as the information that is created and shared between

buyer and vendor allow greater ease in the exchange between supply chain partners. This understanding could point the way for healthcare managers to effectively collaborate with suppliers, and simultaneously ensure relational symmetry.

LIMITATIONS AND FUTURE RESEARCH

This research has a number limitations which should be pointed out. First, the study's snapshot approach allows us to only infer a link between perception and intent. Future research should investigate what factors motivate healthcare supply chain managers to actually continue the use of inventory management solutions such as IVM. A longitudinal approach would be one way to measure perceptions, intent, as well as actual change.

Second, the theories used in this research are only two of many that can be used to study and explain topics in the area of healthcare SCM. For example, future research could use agency theory to further explain and predict buyer-supplier relationships. TCE and contingency theory could both be expanded on in future research, and be applicable to a number of other important topics in healthcare SCM, such as the role of reverse logistics [36].

These limitations notwithstanding, the research presented in this study adds to a limited but growing area in the literature on healthcare SCM, and provides a springboard for further investigations into efficient and effective supply chain operations in healthcare organizations.

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The Integrated Disaster Medical Assistance Team Scheduling and Relief Supply Distribution Problem

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Abstract

In this paper, we study a post-disaster humanitarian logistic problem in which several disaster medical assistance teams or mobile clinics are dispatched to provide medical services to beneficiaries in affected areas. Such services often require a certain number of relief supplies that are sourced from various government- and non-government-operated distribution centers. In emergencies, there is not enough time for these assistance teams or mobile clinics to carry sufficient medical supplies such as medicine, vaccines, gauze pads, and syringe needles with them, and therefore the teams are not able to conduct on-site medical services until the arrival of medical supplies. This paper extends the work of Lei et al. published in Annals of Operations Research, 2015, Volume 235, Issue 1, in which the authors assumed that the medical teams could visit another location after completing services at one demand point, but that "the teams' routes are pre-determined or fixed". In this paper, however, the traveling routes of assistance teams are not given as inputs, and alternatively they must be determined along with the distribution of relief supplies.

Hence, our problem contains a time dependent vehicle routing problem as its sub-problem, making it more complicated. A mixed integer-programming model is first developed to address the issues of equity, efficacy, and efficiency in humanitarian logistics. Then, a two-stage hybrid metaheuristic method is proposed to solve the problem. In the first stage, medical assistance team routes are generated using the Artificial Bee Colony (ABC) algorithm. The fitness function values for feasible solutions are determined through Linear Programming (LP) Relaxation. After the routes are fixed, a Rolling Horizon (RH) approach designed in Lei et al. (2015) is applied to solve the resulting problem. Two other less complex variants of the ABC algorithms in the first stage are also proposed for comparison purposes. Problem instances of various sizes as well as a case study based on the 2016 Kyushu Earthquake in Japan are generated to test our proposed algorithm. Computational results show that the hybrid metaheuristic algorithm is able to find near-optimal solutions in minutes. The performance of the algorithm is also demonstrated to be efficient, especially in emergency situations where quick response is highly desirable.

Keywords: humanitarian logistics; total service completion time; disaster medical assistance team routing; metaheuristics; computational study

The Role of Colleges and Universities in Students' Financial Well-Being

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Introduction

Many adults in the United States exhibit problematic financial behaviors in key areas of personal financial management including budgeting, savings, and the use of credit (Hilgert, Hogarth, & Beverly, 2003; Hira, 2009). This is an area of national concern due to the responsibility of individuals for their own financial wellbeing (Rappaport, 2012) and the impact of uninformed consumers on the economy (Hilgert, Hogarth, & Beverly, 2003; Hira, 2012; "President's Advisory", 2013). In addition, personal financial management is becoming more of a challenge due to the increasing complexity and seemingly limitless choices among products, such as loans, investments, and retirement plans in the financial market (Mandell & Klein, 2009). The need for consumers to utilize sound financial decision making by developing positive behaviors is important in order for the economy to function effectively and efficiently. The benefits of desirable financial behaviors are two-fold when consumers make decisions that ensure their own financial security, society also benefits from them being more productive community members (Hilgert, Hogarth, & Beverly, 2003).

The college years are an especially important time, as young adults gain newfound independence from their parents, which is often accompanied by increased responsibility for their personal financial decisions (Gutter & Copur, 2011; Xiao, Tang, & Shim, 2009). Furthermore, college students face potential long-term negative consequences due to undesirable financial behaviors, such as damage to their credit history, and increased stress and anxiety, which have been linked to lower academic performance and higher dropout rates (Field, 2010; Kettley, Whitehead & Raffan, 2008; Pleskac, Keeney, Merritt, Schmitt, & Oswald, 2011; Sages, Britt, & Cumbie, 2013). Thus, the college environment

provides an excellent opportunity to develop educational strategies to establish favorable financial behaviors before problems develop and become a habit (Shim, Barber, Card, Xiao, & Serido, 2009). College students are at a crucial transitional point in in their life, with the impact of financial decisions having a far reaching influence by affecting their long-term financial wellbeing (Hira, 2012).

Although the benefits of a college education have been documented, the development of financial autonomy during the college years has received limited attention (Shim, Barber, Card, Xiao, & Serido, 2009). Young adults could even be considered a vulnerable group due to the instability of their financial situation (Lokken Worthy, Jonkman, & Blinn-Pike, 2010), with research indicating their increased likelihood of engaging in risky financial behaviors (NFCC, 2012). College students are particularly susceptible to accruing high amounts of debt from both educational loans and credit card use. According to a *USA Today* article (Malcolm, 2014) ensuring that students have basic financial skills, such as, budgeting and how to manage debt are critical as student loan debt continues to increase and "finances remain the number one reason students drop out of school". Sages, Britt, and Cumbie (2013) found that college students reported increased anxiety due to difficulty paying bills, spending more than earned, and reaching the maximum limit on credit cards. The impact of poor financial behavior can have a long-term impact, such as, damage to their credit history, which jeopardizes eligibility for loans to buy a car or home and even may have consequences for renting an apartment or securing a job (Field, 2010). Mary Johnson, director of financial literacy for Higher One, hopes that colleges and universities will incorporate financial literacy into their mission (Malcolm, 2014).

The rest of this paper has been organized into the following sections: definition of key

terms, background on the financial literacy problem and financial education, common financial literacy program models, leaders in financial literacy education and conclusion. A primary goal of this paper is to motivate faculty to become involved in addressing the nationwide problem of financial illiteracy.

Definition of Key Terms

Financial Behavior. According to consumer economists, financial behaviors are positive or desirable behaviors that can be used to improve financial security (Xiao et al., 2009). Four commonly cited domains of financial behaviors include managing cash, credit, savings, investments, and insurance (Dew & Xiao, 2011). According to the Securities and Exchange Commission's (SEC) Office of Investor Education and Advocacy, the roadmap to financial security includes creating a financial plan, paying off high interest debt, and then starting to save and invest ("Securities and Exchange", 2010). Examples of positive financial behaviors include saving regularly, managing spending with a budget, and using credit in a responsible manner by paying off credit card balances in full each month, making payments on time, and refraining from maxing out credit limits (Gutter, Garrison, & Copur, 2010).

Financial Literacy. Generally financial literacy is viewed as a comprehensive term, which includes both knowledge and behaviors related to personal financial issues. According to Gene Dodaro, Comptroller General of the United States, financial literacy is "the ability to make informed judgments and to take effective actions regarding current and future use and management of money" ("Financial Literacy: The Federal", 2011, p.2). Common conceptual components of financial literacy include: "(1) knowledge of financial concepts, (2) ability to communicate about financial concepts, (3) aptitude in managing personal finances, (4) skill in

making appropriate financial decisions and (5) confidence in planning effectively for future financial needs" (Remund, 2010, p. 279). Common topics included in operational definitions of financial literacy include budgeting, saving, borrowing, and investing (Remund, 2010).

Financial Well-Being. According to the Consumer Financial Protection Bureau (CFPB) (2016) financial well-being is a "highly personal state, not fully described by objective financial measures. Instead, well-being is defined as having financial security and financial freedom of choice, in the present and in the future". Financial security includes control over daily and monthly finances and the capacity to absorb a financial shock in the future. Financial well-being also includes the financial freedom to make choices to enjoy life and meet future financial goals.

Financial literacy problem

Numerous statistics based on observable behaviors highlight the struggles that many individuals living in the United States have with personal financial management including the use of debt, saving for the future, budgeting, and cash management (Bricker, Kennickell, Moore, & Sabelhaus, 2012; Jacobe, 2013; "June 2011 Financial", 2011). Budgets serve as an important planning tool in managing cash inflows and outflows, however a recent Gallop annual Economy and Personal Finance survey (Jacobe, 2013) found that two-thirds of individuals reported not preparing a budget and a 2010 Survey of Consumer Finances indicated that 10.8 % of families reported having at least one payment in the last year that was 60 or more days late (Bricker, Kennickell, Moore, & Sabelhaus, 2012). Consumers rely heavily on credit cards with balances averaging $7,219 per household, which is the third largest source of indebtedness only behind mortgages and student loan debt ("American Household", n.d.). In addition 1.4

million personal bankruptcy cases were filed for the 12 month period ending in March of 2012 (“United States Courts”, n.d.). Therefore, it is not surprising that Global Finance magazine reported individual savings rates in the United States are among the lowest in the industrialized world based on data from the last 20 years (Pasquali & Aridas, n.d.). Many Americans are not adequately protected in the case of unexpected events; a recent survey by Bankrate.com indicated that 24% of all respondents reported having no emergency savings (“June 2011 Financial”, 2011). Younger adults are even less prepared with 35% of respondents 18 to 29 years old having no savings and 28% had less than three months' worth of expenses saved (“Financial Security”, 2011). Hira (2009) highlights the prevailing concern that adults of all ages “lack a working knowledge of financial concepts and do not have the tools they need to make decisions most advantageous to their economic wellbeing” (Hira, 2009, p.2).

High debt and low savings rates are an indicator of a potential problem, therefore, survey results of adults and youth in the United States that highlight a lack of basic financial knowledge are not surprising. Almost half of adults in the United States, rated their personal financial knowledge as a C or worse, according to a survey by the National Foundation for Credit Counseling (NFCC) (2012). Also results from the 2012 National Financial Capability study, a comprehensive survey of over 25,000 adults (18+) across the United States, indicate the lack of basic financial knowledge among adults with only 39% of the respondents answering the majority of the questions related to everyday financial matters correctly. The survey was a joint effort of several governmental entities, including the U.S. Department of the Treasury and the President’s Advisory Council on Financial Capability (“Financial Capability”, 2012).

In addition, research indicates that high school and college students are not

knowledgeable about personal financial issues (Agarwal, Amromin, Ben-David, Chomsisengphet, & Evanoff, 2010, Mandell, 2008). Many studies have used a survey tool developed by Dr. Lewis Mandell for the JumpStart Coalition, a nonprofit organization formed in 1995. "Jump$tart is a coalition of diverse financial education stakeholders. These organizations work together to educate and prepare our nation's youth for life-long financial success" ("About the Jump$tart Coalition", 2016). The survey, which eventually evolved into National Standards in K-12 Personal Finance Education, was first administered in 1997 to a random sample of high school seniors across the country and then repeated biennially between 2000 and 2008. College students were surveyed for the first time in 2008. The survey consists of 31 multiple choice questions that cover four key areas of personal finance (1) income, (2) money management, (3) saving and investing, and (4) spending and credit (Mandell, 2008).

Unfortunately, the JumpStart survey paints the same picture regarding the financial knowledge of high school and college students, as the surveys of adults previously mentioned, with scores actually getting worse over time. The first survey resulted in an average grade of a 57.3% of the questions correct with results declining in 2000 and 2002, bumping upward in 2004 and 2006 and then reaching an all-time low in 2008, which was the last year the survey was administered (Mandell, 2008). Agarwal, Amromin, Ben-David, Chomsisengphet, & Evanoff (2010) note that although surveys of financial knowledge may vary in content and sample populations, several common themes can be found: "a large proportion of consumers are not financially literate, even among the wealthiest and most educated population segments… and financial illiteracy leads to welfare-reducing financial behavior and outcomes" (p.3). Personal finance is an important topic due to the increasing complexity of the United States financial system and low levels of financial knowledge.

Recent statistics indicate record high levels of educational debt with the average student owing $25,000 in student loans upon graduation (Ellis, 2011). The default rate on student loans is at an all-time high with one in every five government loans that entered repayment in 1995 in default, which has resulted in $50.8 billion of loans in default at the end of 2009 (Field, 2010). In addition to the burden on the economy, with taxpayers absorbing almost 100% of the cost of the defaulted loans, the students face significant personal and financial burdens. Many young adults, between the ages of 22 and 29, reported delaying or deciding against furthering their education because of the debt they owed (NEFE, 2006). The financial stress is compounded by limited job prospects with a 13% unemployment rate of recent college graduates with bachelor's degree according to a 2013 report by the U.S. Department of Labor. Also surveys indicate that students report feeling pressured to take a job they would not have otherwise accepted due to high levels of debt (NEFE, 2006). The risk of bankruptcy is an additional concern related to high levels of debt, with approximately 110,000 young adults under the age of 25 filing for bankruptcy in 2011 (Valenti, 2012). A report by the Institute for Financial Literacy (2011) indicated that college graduates are the fastest growing age group that filed for bankruptcy in the past five years.

As these students move into the workforce, money-related issues are one of the leading causes of absenteeism and lower productivity due to the inability to focus (Davis & Carnes, 2005). Sages, Britt, and Cumbie (2013) found that college students reported increased anxiety due to difficulty paying bills, spending more than earned, and reaching the maximum limit on credit cards. Also research by Klontz and Klontz (2009) found that when individuals feel stressed or anxious this creates an imbalance in the brain, which is often dealt with by seeking out substances, such as food, nicotine or alcohol, or various human behaviors, such as spending

money.

Also poor financial behavior can lead to additional negative consequences, such as damage to credit history, which limits future eligibility for federal aid and the ability to obtain car loans, mortgages and even apartments or jobs (Field, 2010). According to a recent survey by the National Association of Consumer Bankruptcy Attorneys (NACBA) many young people are delaying important life cycle decisions, such as, purchasing a home or getting married due to large amounts of debt (Nance-Nash, 2012). Higher education is an investment in the future, however, the large amounts of debt that many students are faced with paying off after graduation jeopardizes their long-term financial security.

Financial education

Education is often seen as the solution to low financial knowledge and problematic financial behaviors (Hilgert, Hogarth, & Beverly, 2003) with vast amounts of resources being directed to educational programs. A myriad of organizations support efforts to improve financial literacy including private employers such as commercial banks; government agencies; consumer groups; community service organizations; and religious organizations (Gale, Harris, & Levine, 2012). Several private sector nonprofit organizations, such as the National Council on Economic Education (NCEE), the JumpStart Coalition, and the National Endowment for Financial Education (NEFE) have been instrumental in developing voluntary standards, curricula for educational programs, and survey instruments that assess financial literacy (Mandell, 2008; NCEE, 2012; NEFE, 2006).

Also the low knowledge and problematic financial behaviors of Americans has received attention at the national level and resulted in two legislative acts. In 2003 Congress created the

Financial Literacy and Education Commission to develop a national strategy in recognition of the fact that Americans could benefit from a better understanding of financial matters. The Department of Treasury's Office of Financial Education coordinates the commission and is charged with developing resources for the American public, such as a national website (MyMoney.gov) to provide financial education materials and a toll-free hotline (1-888-My Money). Also the commission conducts regional meetings and conferences to increase public awareness and foster partnerships with private organizations to improve Americans' financial literacy ("Financial Literacy Education", 2013). The second example of regulatory reform, initiated in response to the 2008 financial crisis in the United States, was the Dodd-Frank Act which established the Office of Financial Education within the Consumer Financial Protection Bureau and was charged with developing and implementing a strategy to improve the financial literacy of consumers (Dodd-Frank Act, Title X, Section 1013).

At the state level, the primary focus has been on the development of policies related to requiring personal finance as part of students' high school education. Almost all states have standards related to personal finance education with some states requiring a class in economics or personal finance in order for students to graduate from high school (*Financial Literacy: The Federal*, 2011). According to the National Council on Economic Education's (NCEE) 2011 report

- 50 states require Economics or Personal Finance to be included in the state standards,
- 40 states require the standards to be implemented,
- 25 states require a high school course in Economics or Personal Finance to be offered,

- 22 states require a high school course in Economics or Personal Finance be taken and,
- only 16 states actually require testing of student knowledge in Economics or Personal Finance (NCEE, 2012).

Due to the large amount of resources dedicated to educational initiatives to improve financial literacy, a logical question is whether the programs are effective in accomplishing their goal. However, widely accepted standards of excellence for financial education are lacking, therefore answering this question is not as simple as it might appear. Several studies have attempted to evaluate the effectiveness of education provided in high school or college on financial knowledge and behaviors (Bell, Gorin, & Hogarth, 2009; Bernheim, Garret, and Maki, 2001; Cole, Paulson, & Shastry, 2013; Lusardi & Mitchell, 2006*;* Tennyson & Nguyen, 2001*).* Tennyson and Nguyen (2001) found a significant and positive association between state mandates to take a high school personal finance course and students' financial knowledge scores. Also, the results indicate that students' taking mandated courses knowledge are significantly greater in the topic areas of savings/investing and income, however, no significant relationship was found in the areas of money management and spending/debt. Bell, Gorin, and Hogarth (2009) found that taking a high school financial education course had a positive influence on the financial behaviors of saving and credit management. This study found that individuals who have taken a financial management course were more likely to have a savings account for short term goals, save on a regular basis, and have an emergency fund.

Also positive behaviors related to credit management were found, which included having fewer overdraft fees in the past six months and a decreased likelihood of never paying off their credit card balances. Bernheim, Garret, and Maki (2001) investigated the impact of state

financial education requirements later in life by surveying individuals aged 30 to 49. Survey respondents provided the state and years they attended high school, which was then matched with the historical record of when states adopted financial education requirements. Results showed that individuals who attended high school in a state with a mandated personal finance curriculum reported higher savings rates than those who did not. However recently Cole, Paulson and Shastry (2013) replicated the Bernheim, Garret and Maki (2001) study and found conflicting results after accommodating for state-fixed effects. Perhaps states with mandated personal finance education requirements are somehow different from those states without such mandates. Also evidence was found that during the time when these curricula mandates were imposed was a period of economic growth for the country, which may have independently influenced savings behavior.

Even though several studies (Bell, Gorin, & Hogarth, 2009; Bernheim, Garret, and Maki, 2001; Lusardi & Mitchell, 2007; Tennyson & Nguyen, 2001) have found positive effects of financial management courses, due to conflicting results debate still continues regarding the best place for education and the overall effectiveness. For example, Peng, Bartholomae, Fox and Cravener (2007) found that taking a personal finance course in college enhanced financial knowledge more than taking a high school personal finance course. However interestingly, individuals that had a personal finance course in both high school and college did not perform better on the financial literacy test (Peng et al., 2007). Another study by Mandell and Klein (2009) examined the impact of a personal financial management course completed at one of three high schools within a single school system from 2001 to 2004 and found no significant positive impact for the students who took the personal finance course compared to the students not taking the course. In another study of student perceptions of high school financial literacy

courses, over half of the respondents indicated that important financial management topics, such as auto or home loans, renting or buying a house, and retirement planning were covered in their high school class with budgeting being covered the most frequently *(*Miller, Hite, Slocombe, & Railsback, 2010). Due to conflicting results on the effectiveness of personal financial education offered in high school, a few studies (Peng et al., 2007; Yates & Ward, 2011) have questioned if high school is the best place to offer education on financial literacy.

Several studies have found more short-term strategies, such as seminars, or focused educational programs to be effective. Harter and Harter (2009) found that high school students who participated in a Financial Fitness for Life curriculum, which is published by the Council for Economic Education, knowledge improved on post-test comparisons. Also Borden, Lee, Serido, and Collins (2008) found positive improvements in college students' knowledge and attitudes towards credit after participating in a seminar-based financial education program. For example, after participating in the seminar, students reported more responsible attitudes towards credit and decreases in avoidant attitudes towards credit. The effectiveness of providing education for targeted behaviors on a just-in-time basis as teachable moments arise has been documented in multiple studies of financial counseling for adults. These research findings can be used to inform educators of high school and college students as they develop educational strategies (Agarwal, Amromin, Ben-David, Chomsisengphet, & Evanoff, 2010; Collin & O'Rourke, 2010; Hathaway & Khatiwada, 2008).

Certainly the goal of providing information through courses or seminars is a worthy endeavor, however due to the lack of a standard curriculum widely accepted standards to evaluate program effectiveness do not exist. Nonetheless, eight elements are recommended by the Treasury's Office of Financial Education for a successful financial education program, which

focus on program content, delivery, impact and sustainability ("Treasury launches", 2004). The first two elements relate to program content, which should be tailored to the target audience and focus on basic savings, credit management, home ownership and retirement planning. The third and fourth elements relate to the recommended delivery of the program content through local distribution channels to make use of community resources and contacts. Follow-up with participants is also important for an effective program to reinforce the message. The fifth and sixth elements note that successful financial education programs measure their impact by establishing specific goals and tracking progress towards the goals. Also the positive impact of programs can be demonstrated by objective evaluation through testing or surveys. The final element of a successful program relates to sustainability, which can be demonstrated if the program is easily replicated on a local, regional or national basis and continues to receive financial or legislative support. The intent of these standards is to guide organizations as they develop programs or strategies for financial education ("Treasury launches", 2004).

Financial Literacy Program Models

So clearly the evidence supports the lack of positive financial behaviors and overall financial literacy of both adults and youth in the U.S. The question then becomes "Where is the best place to teach financial literacy and whose responsibility is it?". As noted previously, research is conflicting on the effectiveness of high school financial literacy (Peng et al., 2007; Yates & Ward, 2011) and debate continues whether the responsibility for educating youth on important money management topics rests with parents or educators. Among educators there is debate as well, whether primary, secondary or higher education should take the lead in addressing this problem. According to Rose (2015), the assistant director of financial literacy and education programs at Syracuse University, "with the passing of the "buck", our new college

graduates are no further along with financial knowledge than their parents before them". College administrators should feel confident that students are leaving their institutions with basic knowledge on how to manage their finances as they begin their careers. However as colleges and universities across the country are faced with reduced budgets, lower student enrollments, and staff already stretched thin with perhaps little or no formal financial literacy training starting a new program can be a challenge.

According to research by Coalition of Higher Education Assistance Organizations (COHEAO) there is no perfect operational model for a campus financial literacy program however four common approaches have emerged: 1) financial education/counseling centers, 2) peer-to-peer programs, 3) programs delivered by financial professionals, and 4) distance learning programs (Federal Reserve Bank of New York, n.d.). These models are managed by a wide variety of campus departments most often within academic affairs or student affairs (Grable, Law, & Kaus, 2012).

Regardless of approach, it is crucial for colleges and universities to spend time up front becoming familiar with issues important to students on their campuses before developing a plan. A first step is to talk with faculty and staff across campus to understand current trends, such as, how frequently emergency loans are requested, timeliness of payment for student bills, prevalence of financial holds on student accounts and default rates for graduates (COHEAO, 2014). This information can often be obtained from offices, such as, Financial Aid, Business Office and Institutional Research. In addition to financial information, data on student characteristics such as demographics, work obligations, course load and mental health/wellness could be helpful in developing a financial literacy plan.

Research (Mandell & Klein, 2007; McCormick, 2009) has documented the success of four specific approaches: 1) interactive online programs, 2) classroom-based programs, 3) game-based education, 4) event-based programs, and 5) individual counseling. Interactive online programs are popular at larger institutions since they are cost efficient and allow students to learn at their own pace on their own schedule. The main downside is the lack of human interaction, which can be offset by incorporating multimedia videos to increase student engagement (COHEAO, 2014). Another option is classroom-based programs, such as, semester length courses or guest lectures in certain classes. Again this approach is relatively low cost since large numbers of students can be reached at one time; however the ability to tailor the education and counseling to individuals within the class is somewhat limited. Also the use of financial games, which can include simulations, contests, board games, card games, or electronic games, increases the "fun factor" which can create a collaborative learning environment. Special events are the fourth method often used to help programs gain visibility on campus, create buy-in and deliver program content. The final approach is individual counseling, which can be provided by professional staff members or student peers (Grable et al., 2012). Regardless of who is providing the counseling the format can be face-to-face, over the phone or web-based. The counseling services provided can range of services from providing assistance when dealing with financial problems to more preventive assistance, such as, goal setting, establishing a budget which can include managing cash and credit.

Leaders in Financial Literacy Education

According to a survey conducted by Student Lending Analytics, more colleges are offering or planning to offer financial literacy education (Alban, 2012). Several colleges have emerged as leaders in financial literacy education and their programs provide great ideas and

advice for organizations interested in starting their own programs. The good news is that college and university faculty and staff do not have to design a program from scratch to start addressing the need for financial literacy on their campuses. The two programs that will be reviewed in this paper are Syracuse University and the University of Arizona.

At the University of Arizona, Take Charge America Institute (TCAI) was created in 2004 by an endowment with a mission of improving the money management skills, economic reasoning and financial capabilities of youth under 25. TCAI uses a variety of approaches to achieve it's mission. For example the school offers a three-credit elective course, which is offerred on-line and in person, that focuses on personal finance and American culture; since it draws on economics, sociology and psychology the course satisfies a general education requirement. Another very successful program is Credit-Wise Cats which "trains and supports a group of student financial education ambassadors who conduct workshops and seminars for college students on campus and for students in grades 7-12 in the greater Tucson area schools" (Eades, 2012, p. 192). Also in 2011 TCAI launched a youth-oriented website "to facilitate independent, experimental learning with the belief that financial capability is built over time and largely outside the classroom. Students don't learn personal finance, but rather they develop financial decision-making skills by repeatedly making choices, observing outcomes, weighting new options and making more choices" (Eades, 2012, p. 192). Many of the programs are directly replicable on other college campuses or free resources are available that college faculty and staff can tailor to local needs.

At Syracuse University, the goal is for financial education to be a parallel education to their academic education and be the norm. Rebecca Rose (2015), assistant director of financial literacy and education programs at Syracuse, uses the F.O.C.U.S. Model to guide their program.

F stands for the Foundation of the program and involves ensuring that the program matches the institutions values and defining the message and learning goals for participants. Next determining the order of the program is important and could ultimately impact the overall success. C stands for cultivating a network across campus to identify who will deliver the program content and if education is needed or perhaps new hires are required. The following step of utilizing resources is about networking with other areas on campus to effectively use the financial and human resources available. Finally the last phase is starting the program and remembering to refer to the F.O.C.U.S. model as problems are encountered.

Syracuse University launched their financial literacy program entitled "I Otto Know This!" in April of 2010. The program has two core goals: 1) the program includes all students at Syracuase including undergraduate, graduate, part-time students and the Law School 2) the program information is current, relevant and easy to obtain. The program is marketed through the college newspapers and campus listservs. Federal work study students are frequently enlisted to develop or provide feedback on ideas. The current financial literacy program has multiple levels, which includes online self-directed modules, Money Awareness Program for targeted student populations, e-news, and college-wide financial literacy presentations. Future plans include developing peer-to-peer counseling, a video series, and increased presence in campus classrooms (Alban, 2012).

Conclusion

The 2008 financial crisis highlighted the shared responsibility of individuals who voluntarily added unmanageable levels of debt to their personal balance sheets. The ability of individuals to make prudent credit and other financial decisions would appear to be teachable skills with the education industry seeming to have partial responsibility for this. Statistics based

on observable behaviors indicate this is not as easy as expected with record low savings rates and increased utilization of debt. However even prior to the financial crisis of 2008, American households were faced with increasingly sophisticated and complicated financial products and increased responsibility for their own financial well-being as employers shifted more health insurance costs to employees, as well as, funding and decision making related to retirement plans. In addition, increases in tuition costs grew faster than income raiseing the question of whether to invest in higher education. All of these factors combined test the financial decision making skills of households across the U.S.

The college years are an influential period in many young adults' lives as they transition from the supervision of their parents to overseeing their finances independently, often for the first time, by using a budget, paying bills and accessing credit (Gutter & Copur, 2011; Xiao, Tang, & Shim, 2009). Research indicates that financial habits, both positive and negative, that develop during this period are likely to persist to adulthood (Xiao, et al., 2009). In addition, the impact of poor financial behavior can have a far reaching influence on students' long-term financial wellbeing, such as damage to their credit history, which jeopardizes eligibility for loans to buy a car or home and even may have consequences for renting an apartment or securing a job (Field, 2010). Due to the responsibility of individuals for their own financial security and the impact of uniformed consumers on the economy, colleges and universities are in the unique position of having a captive audience. Although results have been somewhat mixed regarding the most effective approach to financial education many resources, often free are available to colleges and universities. In addition, as institutions strive to increase student retention and graduation rates, offering financial education programs may bolster their public image and mission. The goal of this paper is to motivate faculty to become involved in their local

community and on their college campuses to do our part in addressing the nationwide problem of financial illiteracy.

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THE ROLE OF CULTURE AND GENDER-BASED DIFFERENCES IN THE ATTITUDES TOWARD WOMEN AS MANAGERS

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ABSTRACT

A number of studies have examined the attitude toward women managers across different nations. The near consensus result is that negative attitude toward women managers persist across the globe. Women in general, regardless of culture, tend to have more positive attitude toward women managers than their male counterparts. This paper examines these studies with the intent of highlighting the variables that may be better predictors of attitudes toward women as managers in multiple national contexts. There are indications that certain cultural factors and gender-based perceptual differences can be used to predict the level of acceptance that females may encounter in upper managerial ranks.

INTRODUCTION

First receiving widespread attention following a 1986 special report published in the *Wall Street Journal*, the term "glass ceiling" has been used to describe the barriers faced by women in the workforce as they struggle to advance their careers into top management positions. More specifically, "glass ceiling" refers to the imperceptible barriers encountered by female employees, as opposed to overt discrimination, that have persistently limited their accessibility to leadership positions in organizations [2, 42, 64]. The "glass ceiling" has inspired many variations including the "bamboo ceiling" in reference to Asian-Americans and the "marble ceiling" in reference to women in government.

Gender role stereotypes have received a great deal of attention in the management literature and have been cited as one of the major factors contributing to the glass ceiling effect [37,38, 44]. Gender role stereotypes refer to the commonly held beliefs about characteristics that describe men and women. In general, men are most often regarded as aggressive, competitive, assertive, and competent, whereas women are most often regarded as kind, expressive, empathetic, compassionate, and nurturing [11,15,32]. These same set of beliefs have reinforced a "think manager, think male" climate in the workplace, with research indicating that the characteristics attributed to successful managers are also the ones most closely associated with the stereotypical male image [26, 49, 50, 51, 53]. Accordingly, women are thought to be less effective and efficient in managerial roles when compared with their male counterparts. In effect, women are unable to ascend to top leadership positions in their organizations due to conflicting role expectations [20, 52, 53].

Prior research holds that women tend to embrace more favorable attitudes toward women roles [20]. Furthermore, numerous studies indicate that individuals tend to maintain and promote attitudes which reflect an advancement in status, position, or power of the group to which they belong [13, 36, 40, 57, 63]. Applied within the context of management, these tenets suggest that the extent to which men and women are differently

positioned in their organizational roles, such that men are thought to be effective and efficient managers and women are thought to be ineffective and inefficient managers, that one would expect women to express attitudes toward women as managers that would improve their disadvantage whereas men would express attitudes toward women as managers that would maintain their advantage [20]. Thus, on average, women should hold more favorable attitudes toward women as managers when compared to their male counterparts. This prediction is well-supported and documented in the literature [1, 3, 10, 35, 43].

Fast paced globalization in recent years has resulted in complex global staffing challenges for multinational corporations (MNCs). Although careful and skilled mobilization of human resources across international borders is essential to implementing global business strategies, MNCs have quickly found their talent pools lacking the necessary global leadership capabilities to fill expatriate roles [23, 39]. Accordingly, in order to fulfill their strategic aims, MNCs must broaden their talent pool by capitalizing on valuable and underutilized resources, namely women.

According to data from the World Bank [65], women presently represent 39.6% of the global workforce. Labor force participation rates for women vary greatly within countries, where they are as high as 54% in Rwanda but as low as 13.1% in the United Arab Emirates. Nevertheless, several studies in developed countries have reported that while the number of women in the workplace has grown, the number of women in managerial roles has all but stalled [31, 62]. For example, although women make up 45% of the overall S&P 500 labor force, they account for only 37% of the first or mid-level managers in those companies. Moreover, women represent only 25% of S&P 500 executive and senior level managers, hold only 19% of its board seats, and comprise only 4.6% of its CEOs [7].

The ratio of women-to-men participating in expatriate assignments is similarly imbalanced. According to Brookfield's Global Mobility Trends Survey [4], women account for only 25% of all international assignments. Of the 163 MNCs surveyed (comprising over 11million employees), 37% indicated that low female acceptance of international assignments had adversely affected their efforts to create gender balanced senior management teams. At the same time, 59% reported that women face greater obstacles to accepting international assignments than males. Among these obstacles, negative stereotypical attitudes that men have about women have played a critical role in slowing their entrance into international management positions [9, 31, 49, 51].

Attitudes toward women in managerial roles have been widely investigated in the literature [e.g., 25]. Although research has shown that women are just as capable as men, women continue to be perceived as lacking the necessary knowledge, skills, and/or abilities to be successful in upper management roles [16, 25]. This is troubling because conscious and unconscious stereotyping of women in managerial roles may result in discriminatory behavior [31, 60]. As MNCs consider females for expatriate manager assignments, it is important they fully understand the attitudes of their workforce in both parent and host countries. For example, if results were to reveal that male supervisors held unfavorable views of women as managers, then MNCs would benefit from directly confronting and discussing these prejudices with them.

Historical overview of attitudes toward women as managers' research

Interest in attitudes toward women as managers burgeoned in the 1970's, particularly with the development of several different measures aimed at assessing negative stereotypical impressions of women in leadership positions. For example, Schein [49] first developed the Descriptive Index, which measured sex-role stereotyping by asking respondents to identify which characteristics they felt were critical for success as a manager. Shortly thereafter, Peters, Terborg, and Taynor [47] developed the Women as Managers Scale (WAMS) in an effort to better identify, measure, and understand stereotypical attitudes toward women in managerial roles. Following suit, Dubno, Costas, Cannon, Wankel, and Emin [17] then developed the Measuring Attitudes Toward Women Executives (MATWES) scale in an effort to measure managerial attitudes toward women executives.

At first, research concerning attitudes toward women as managers was carried out exclusively in Western samples. For instance, in a study of 280 employees working in an international distributing company, females held significantly more favorable attitudes toward women as managers than men [56]. Further, Terborg et al. [56] found that while certain personal data (e.g. education) was positively related to attitudes toward women as managers, organizational data (e.g. salary) had no relationship.

Similarly, research among MBA students between 1975 and 1983, found that male students maintained consistently negative attitudes toward women as managers while female students maintained consistently positive attitudes during the same eight-year period [18]. Everett, Thorne, and Danehower [21] replicated and extended Dubno [18], exploring MBA student attitudes toward women as managers from 1975 to 1991. They found that attitudes of male MBA students towards women as managers were still largely negative, while the attitudes of female MBA students were still largely positive.

Papalexandris and Dimitris [46] also found that females held more favorable attitudes toward women as managers than did males, refuting what earlier researchers had labeled the "queen bee syndrome," which argued that successful women viewed other women as competition and therefore held negative attitudes toward them. They further found evidence of "professional stereotypes," observing that workers in certain departments (e.g. production), certain fields (e.g. manufacturing), and even certain sectors (e.g. private) held less favorable attitudes toward women as managers.

Although they did not perform any systematic analyses (e.g. MANOVA), Owen and Todor [45] reviewed mean scores for males and females on attitudes toward women as managers from two groups: undergraduate business students and human resource professionals. Their review suggested that females in both groups held more favorable attitudes toward women as managers than did their male counterparts and that human resource professionals held more favorable attitudes toward women as managers than did the undergraduate business students.

Later, research concerning attitudes toward women as managers began to receive attention internationally [9]. For example, Gulhati [24] examined differences between 173 male and female managers working in the health, social service, and education sectors in India using WAMS. Their study found that Indian female managers held more favorable attitudes than did their male counterparts and while education was associated with more favorable attitudes, other demographics such as age were not. Similarly, Ng [9] studied differences between male and female part-time MBA students in Hong Kong using WAMS.

Although significant differences related to sex were found, there were no significant differences related to demographic variables. In a mixed sample of undergraduate business majors, government employees, and bank employees in Nigeria, Adeyemi-Bello and Tomkiewicz [1] found that Nigerian females held more favorable attitudes toward women as managers than did Nigerian males. Koshal, Gupta, and Koshal [34] examined the perceptions of Malaysian men and women executives about female managers in corporate Malaysia. Results indicated that female managers perceived resistance from both males and females related to their advancement and that resistance appeared to be stronger from subordinates than upper managers.

Ramgutty-Wong 48] in a survey of 432 chief executives, assessed attitudes toward women as managers in Mauritius using several single-item statements. In response to the statement, "I strongly appreciate the idea of women in management," 44% of chief executives answered they "liked" the idea, whereas no executive answered that they "opposed" the idea. Executives further indicated that they believed 44.2% of men would feel uncomfortable having a female boss while only 12% of women would feel uncomfortable in the same situation. In 2001, Liu, Comer, and Dubinsky [35] studied attitudes toward women as managers in a sample of Chinese salesmen and saleswomen. They found significant differences related to gender, indicating that saleswomen held more favorable attitudes toward women as managers than did salesmen.

Finally, scholarship concerning attitudes toward women as managers transitioned over into cross national research. Cordano et al. [9] first examined attitudes toward women as managers in a sample of Chilean and U.S. male and female undergraduate business students. Their analysis found that were no differences in "acceptance" of women as managers across cultures, but there were differences related to sex. Further, they found that both sex and culture were related to the perceived "ability" of women as managers. Lastly, they found that sex explained nearly three times the variance in attitudes toward women as managers than did culture. Tomkiewicz, Frankel, Adeyemi-Bello, and Sagan [59] compared attitudes toward women as managers between male and female U.S. and Polish "professionals" who had clear, well-defined decision making authority and responsibility in their jobs. Results indicated that Polish respondents as a whole held more conservative attitudes toward women as managers when compared to U.S. respondents as a whole. Further, results indicated that U.S. females held the most favorable attitudes toward women as managers followed by Polish females, then U.S. males, and finally Polish males.

In 2006, Guney et al. [25] studied attitudes toward women as managers in a sample of 219 academicians in Turkey and Pakistan. Their study found that both Turkish males and females shared negative views of women as managers and that women's' attitudes were even more negative than men's. Further, in relation to attitudes toward women as managers, they found that Pakistani women held more favorable attitudes than Pakistani men, Pakistani women held more favorable attitudes than Turkish women, and that Pakistani men held more favorable attitudes than Turkish men. In 2009, Sincoff, Owen, and Coleman [54] studied attitudes toward women as managers in sample of undergraduate and graduate business students in China and the U.S. Their study indicated that overall, women were perceived less favorably as managers by Chinese and U.S. males as compared with Chinese and U.S. females.

Javalgi et al. [31] studied attitudes toward women as managers in undergraduate business students across China, Chile, and the U.S. Their study found that U.S. men and

Chilean men held more favorable attitudes toward women as managers than did Chinese men. Additionally, Chinese men and women held the least favorable attitudes overall. Last of all, Simmons, Duffy, and Alfraih, [55] studied the relationship between social dominance orientation, power distance, and attitudes toward women as managers in a sample of U.S. and Kuwaiti men. Their study found that social dominance orientation was negatively related to favorable attitudes toward women as managers in both cultures. Further, power distance and social dominance orientation were found to interact and influence attitudes toward women as managers.

The Role of Culture and Attitudes toward Women as Managers

Hofstede's [27] model of cultural dimensions is the most widely used typology for characterizing national cultures. In his seminal piece, Hofstede analyzed responses from more than 100,000 people across more than 50 different countries regarding their attitudes about their employment and work environment. His findings revealed systematic cultural differences along four dimensions: *power distance (PD), individualism/collectivism, uncertainty avoidance, and masculinity/femininity.*

PD is defined as "the extent to which one accepts that power in institutions and organizations is distributed unequally" [33, p. 745]. In other words, PD reveals the extent to which a culture accepts inequality among social groups (e.g. men and women) and therefore has particular significance for understanding attitudes toward women as managers [27]. Cultures low in PD encourage diverse opinions and perspectives and welcome and value the contributions of everyone regardless of social status. In contrast, cultures high in PD often support and reinforce inequalities between groups (e.g. men and women) and develop policies and provisions that maintain a clear hierarchy of who commands and who obeys.

Indeed, prior research has found PD to influence the perceptions of men and women, especially in business settings [22, 55, 66]. For instance, Caligiuri and Tung [6] found that PD had a negative effect on the cross-cultural adjustment of expatriate women as compared to men. Thus, cultural attitudes about power appear to influence perceptions of women and expectedly should influence perceptions about women in managerial roles. For example, attitudes toward women in managerial roles should be markedly different if one were to compare the U.S. (a country reporting a low PD score of 40) to a country such as Saudi Arabia (a country reporting a high PD score of 95). Unsurprisingly, a review of the available data reveals that women in the U.S. make up 46.8% of the total U.S. labor force [14] whereas women in Saudi Arabia make up only 16% of the total Saudi Arabian labor force [4]. Similarly, it is unsurprising to find that nearly four times as many women are employed as managers in the U.S. as compared to women in Arab countries where PD as a whole is high [30].

Masculinity/femininity is a cultural dimension which ""refers to the distribution of values between the genders …" [29]. In a society regarded as feminine there should not be a strong differentiation between genders and their social roles. Thus, in feminine societies Hofstede [28, p. 297] noted that "Both men and women are supposed to be modest, tender, and concerned with the quality of life." Feminine societies should reflect smaller wage gaps between genders as well as an increased number of women in managerial roles. Conversely, in masculine societies social gender roles are clear and distinct. Thus in masculine societies Hofstede [28, p. 257] noted that "Men are supposed to be assertive, tough, and focused on material success; women are supposed to be more modest, tender,

and concerned with the quality of life." Masculine societies should reflect larger wage gaps between genders as well as fewer women in managerial roles.

CONCLUSION

The research to date indicate that multiple variables can be used to predict the attitudes toward women as managers in different national contexts. At the most basic level, demographic variables can be used to predict attitudes toward women as managers. For example, older adults tend to have more conservative attitudes toward women as managers than their younger counterparts. Similarly, as previously mentioned, women tend to have more positive attitude towards women as mangers than men. Cultural variables like religion also affect attitudes toward women managers as do national values and norms. The results of the impact of education on the attitude towards women as managers is mixed. In certain situations, the higher the level of education, the more favorable the attitudes toward women as managers. Other studies did not find support for more education leading to more positive attitudes. In the final analysis, it is encouraging that more cross-cultural studies are being undertaken to highlight the potential impediments, both normative and cultural, that may affect women's climb up the corporate ladder.

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The Transformative Power of Undergraduate Research: An Observation

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Abstract

Many colleges and universities have adopted and incorporated undergraduate research into their programs. The students who perform undergraduate research gain valuable experiences working through the research process and the colleges and universities who offer undergraduate research get to promote the opportunities to prospective students. In this paper, an undergraduate research project performed by a student is discussed. The results of the study and impact of the research are presented. The positive impacts of the research far exceeded those established at the beginning of the study. Although the results are presented for a particular study, the observations undoubtedly apply to many other undergraduate research projects performed at many other colleges and university. The purpose of the paper is to discuss a typical undergraduate research project and present the observed higher-level impact of the undergraduate research project since the full benefits may not be readily apparent at the start of any project.

Background

The benefits of undergraduate research have been documented by many organizations. The Association of American Colleges and Universities (AAC&U) lists undergraduate research as a high-impact practice (Kuh, 2008). Initially, the student and faculty mentor develop a well-defined research question based on predetermined goals, the current capabilities of the student, interest in a topic and available resources at the college or university. With guidance from the faculty member, the student studies information about the topic, formulates a methodology or set of procedures to answer the research question(s), performs the analysis, interprets and presents the results.

Students who perform undergraduate research have higher retention rates and graduation rates, and are generally more prepared when they attend graduate school or work in their chosen field. In addition, students who conduct undergraduate research have increased critical thinking and problem solving skills. Furthermore, employers want to hire employees with these advanced skills and students who conduct undergraduate research are more prepared to conduct research at the graduate level. Because of this, many colleges and universities have either adopted or expanded undergraduate research opportunities at their schools. Wesley College in Dover, Delaware has implemented an extensive undergraduate research program (D'Souza, et.al., 2016). One important opportunity at Wesley College is a Scholars' Day program whereby undergraduate students conduct research and present their results. Wesley College has also benefited from grant funding from the Delaware IDeA Network of Biomedical Research

Excellence (DE-INBRE), Delaware Experimental Program to Stimulate Competitive Research (DE-EPSCoR), National Institutes of Health (NIH) and the National Science Foundation (NSF).

The Development of a Research Study Question

Kasey Thompson, a math major at Wesley College wanted to apply for a NASA summer research grant through the Delaware NASA Space Grant Consortium. Kasey wanted to be a middle school or high school math teacher, and she indicated that this summer research internship would be a great way for her to share her experiences with the next generation of students and answer the familiar question "What can I do with math and/or a math degree?" The internship was approved and Kasey also received funding to present her results at the American Association for the Advancement of Science (AAAS) 2014 Annual Conference through The Wesley College Directed Research Program which was supported by the DE-INBRE and the DE-EPSCoR grants - grants from the National Institute of General Medical Sciences - NIGMS (8 P20 GM103446-13) from the National Institutes of Health (NIH); a National Science Foundation (NSF) Delaware EPSCoR grant EPS-0814251; and an NSF ARI-R2 grant 0960503.

Kasey enjoyed calculus and wanted to know how calculus was used to analyze problems in the real world. She approached me and asked if I would be her faculty mentor to research how NASA uses calculus. Knowing that Kasey wanted to be a teacher I was thrilled to learn of her interest and agreed. The first task was to develop a good research question. After conducting a little background research, we found that NASA publishes many articles on specific topics for educators ("Astronomy and Space Science Problems Involving Calculus," n.d.) and found one titled "Estimating the Mass of Comet Hartley-2 using Calculus". The NASA article showed an example of how the disk method from calculus could be used to estimate the volume and mass of Comet Hartley-2. The polynomial that defined the profile of Comet Hartley-2 was presented in the NASA article, but it did not discuss how the polynomial was determined.

The research for this study was to evaluate a methodology to estimate the mass of asteroids using calculus. Regression analysis was used to determine an appropriate function that defines the profile of an asteroid from a two-dimensional picture. The disk method from calculus was used to determine the volume of the asteroid. The formula mass = density x volume was then used to estimate the mass of the asteroid. The estimated masses of the asteroids were then compared to published volumes and/or masses to evaluate the methodology.

Clear photos of thirty-six asteroids with published volumes and/or masses were found. Another criterion for the selection of the photos was to look for asteroids that were approximately symmetric when rotated around the centroid. This was essential given the way the disk method would calculate the volume. Some of the photos had a clearly defined profile and the centroids were perfectly aligned with the x-axis for analysis, such as asteroid Ceres in figure 1. A review of other photos of other asteroids revealed clearly defined profiles, but showed centroids that were not perfectly aligned with the x-axis. The x-y coordinates were rotated so that the centroid would be parallel to the x-axis. See the image of asteroid Apophis in figure 2 for an example of an asteroid with x-y coordinates that required rotation.

Figure 1 Image of Asteroid Ceres

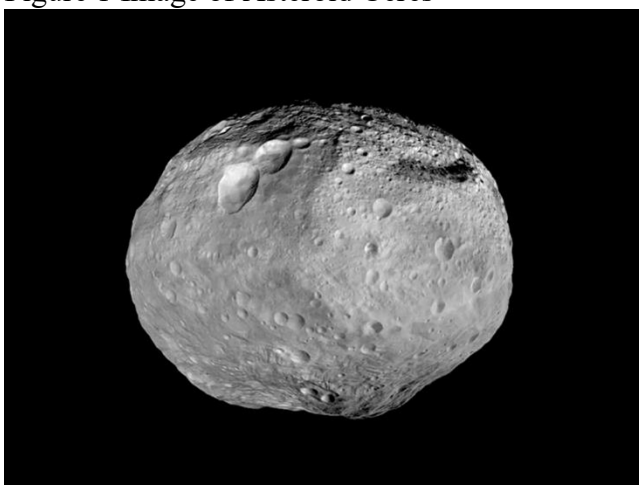
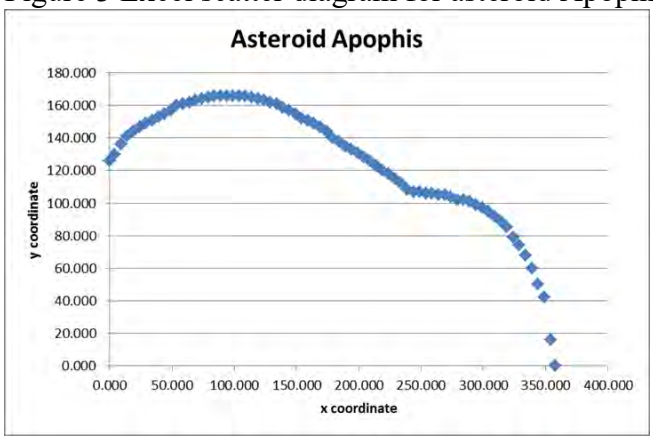


Figure 2 Image of Asteroid Apophis

The next phase of the research involved the determination of (x, y) ordered pairs that would define the profile of the asteroid. Although this requirement was known at the conception of the project, the solution started to reveal some of the unforeseen advantages and benefits of undergraduate research projects such as this one. After consultation with Kasey, pixel cell counts from MS Paint were used to compile the x-y coordinates from the photographs. Even though a software package might have accomplished this task, pixel cell counts using MS Paint was selected since the goal of the project was to see mathematics in action. However, the origin for the MS Paint pixels appeared in the top left-hand corner of the photos. The origin would have to be moved before further analysis was conducted. We decided to use MS Excel and simple mathematical operations to reposition the origin. Figure 3 shows an Excel scatter diagram with the x-y coordinates for asteroid Apophis.

Figure 3 Excel scatter diagram for asteroid Apophis

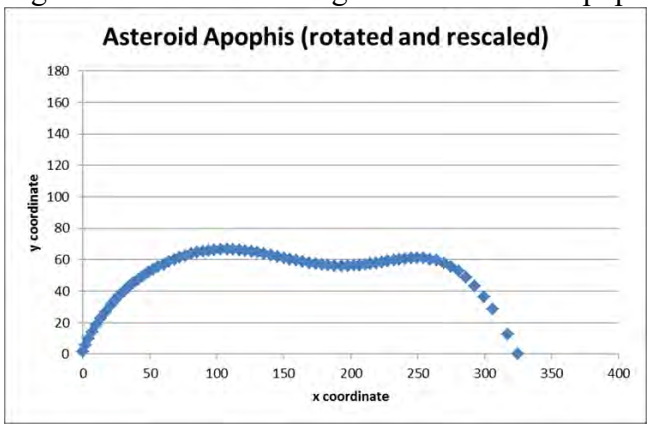


The scatter diagram from figure 3 revealed that the ordered pairs still needed to be rotated in a counter-clockwise direction. This problem was not considered at the start of the project. However, this was a great opportunity for the use of critical thinking and problem solving skills. In our initial meeting to discuss this problem, a proposed solution was developed. Transformation matrices from linear algebra could be used to rotate the x-y coordinates. Not only did the proposed solution solve the problem, but the solution involved the integration of mathematical concepts from different courses, namely statistics and linear algebra. Kasey immediately realized that mathematical concepts from different courses could be integrated and applied to the real world. The transformation matrix used in the analysis is presented in equation 1.

$$M = \begin{bmatrix} cos(\theta) & -sin(\theta) \\ sin(\theta) & cos(\theta) \end{bmatrix} \qquad Equation\ 1$$

The rotation angle θ was calculated using algebra and MS Excel. Equation 1 was used to rotate and/or translate the ordered pairs to place the origin at the first set of coordinates so that the centroid of the asteroid was placed on the x-axis. The rotated x-y coordinates for asteroid Apophis is presented in figure 4.

Figure 4 Excel scatter diagram for asteroid Apophis



Regression analysis in MS Excel was then used to find a reliable function to define the profile of each asteroid. The regression equation was written as a function of higher ordered powers of x, the distance from the origin on the x-axis. The R-squared value, standard error, F-value, significance F and t-values for the individual powers of x were analyzed to select the best regression. Figure 5 shows the regression equation results used for asteroid Apophis.

Figure 5 Regression Analysis for Asteroid Apophis

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.998368286
R Square	0.996739235
Adjusted R Square	0.996388076
Standard Error	0.003169604
Observations	73

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	0.199611421	0.028515917	2838.424778	3.12116E-78
Residual	65	0.000653015	1.00464E-05		
Total	72	0.200264437			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.005143711	0.001988648	2.586536843	0.011942248	0.001172107	0.009115316	0.001172107	0.009115316
x	1.929634499	0.082295474	23.44763824	2.01066E-33	1.765279089	2.09398991	1.765279089	2.09398991
x2	-10.50432356	1.034482206	-10.15418487	4.83137E-15	-12.57032719	-8.438319935	-12.57032719	-8.438319935
x3	44.72597905	5.595977198	7.992523461	3.00927E-11	33.55004085	55.90191724	33.55004085	55.90191724
x4	-125.0878959	15.25774338	-8.198322172	1.29715E-11	-155.5597136	-94.61607817	-155.5597136	-94.61607817
x5	192.5252967	21.98283988	8.757981122	1.32344E-12	148.6225338	236.4280596	148.6225338	236.4280596
x6	-146.2179106	15.9637165	-9.159390335	2.59795E-13	-178.099654	-114.3361672	-178.099654	-114.3361672
x7	42.62517072	4.598585026	9.269192694	1.66714E-13	33.44116224	51.8091792	33.44116224	51.8091792

Suitable functions were found for 18 of the asteroids. The R-squared values ranged from 0.9451 to 0.9989. The F-values ranged from 77.959 to 3391.327. Finally, the degree of the functions ranged from 6 to 8. Maple and the disk method from calculus were then used to estimate the volume of the asteroids using the integral presented in equation 2.

$$Volume = \int_0^l \pi\big(f(x)\big)^2\,dx \qquad Equation\ 2$$

The mass of the eighteen asteroids were then estimated assuming the density of rock (3.2 g/cm^3) and equation 3.

$$Mass = Density \cdot Volume \qquad Equation\ 3$$

Conclusion and Discussion of the Broader Impact

The benefits of undergraduate research are readily apparent in most cases. However, a truly remarkable transformation occurs when undergraduates conduct the research. An unknown, but outstanding result of the research was the inclusion and integration of many of the mathematical techniques Kasey learned in her math classes at Wesley College. In other words, many of the different mathematical techniques were tied together and used to solve one research question. Kasey was able to realize the importance of math and how multiple mathematical concepts can

be applied to real world situations. In addition, this research required extensive problem solving techniques when challenges were discovered. Kasey became more confident in her abilities, her critical thinking abilities increased and her problem-solving skills improved. Lastly, Kasey fulfilled her dream and is now a highly successful middle school math teacher. Not only that but Kasey is now able to share her experiences of undergraduate research to her middle school students and provide them with examples of how mathematics can be applied to the real-world.

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TRACKING THE S&P 500: SOME SUMMARIES AND STOCHASTIC VERSUS DETERMINISTIC TRENDS

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ABSTRACT

This investigation provides decade-by-decade "rate of return" statistics on a common index for stocks. Four variations of the S&P 500 are considered: the S&P 500 index, the S&P 500 with reinvested dividends, and each of those indexes adjusted for inflation as measured by the Consumer Price Index. Also included is a comparison of deterministic versus stochastic trends fitted to monthly data. Selected forecast profiles are provided as well. The paper documents very different returns by decade, including the current (unfinished) decade's strong performance.

INTRODUCTION

The S&P 500 index is a common benchmark for stock market performance. The returns to this index represent a reasonable comparison for those who invest in (other) stocks or other indexes. There exist (of course) plans offered by many investment management companies that tie directly to the S&P 500 index. The index consists of the common stocks of 500 large companies listed on the New York Stock Exchange (NYSE) or the National Association of Securities Dealers Automated Quotations (NASDAQ). The S&P 500 is weighted by the S&P Dow Jones Indices. The diversity of the index and its weighting make the S&P 500 one of the best overall representations of US stock market performance.

In this paper the post-war returns are considered by decade (for convenience only) as well as over the full time period. Also considered are the forecast profiles if the series is modeled as either a deterministic trend or a stochastic one.

The rest of the paper is organized as follows: in the next section the variations on the data and its source are described; the following section describes the methodology; the results follow; and the last section offers conclusions and qualifications.

DATA

All of the data were obtained from the website maintained by Robert Shiller, the author of *Irrational Exuberance*, (http://www.econ.yale.edu/~shiller/data.htm). The dataset utilized includes the S&P 500, dividends, the CPI, and other variables on a monthly basis dating back to 1871. Here the focus is on the post WWII era through the present with emphasis on long-term

returns. The precise data span is from March 1948 through July 2016. The S&P 500 is measured as monthly averages of daily closes, and the dividend series is computed from the S&P four-quarter totals with linear interpolation to monthly figures.

The dividend figures are utilized to produce the S&P 500 total returns series by reinvesting the dividends to the next month's realization. For any researcher computing such a series, note that the dividend series should be divided by 12, since the dividend series provided by Shiller are *annualized* dividends for the S&P 500.

METHOD

Simple Descriptive Measures

The first presentation in the following section is simply descriptive measures of percentage returns. The method utilized for measuring the returns is to compute the natural log difference between the series at two different times and divide by the intervening number of years. This method yields annual instantaneous rates of return, as represented in the well-known formula:

$$FV_{t+n} = A_t(e^{rt}) \quad (1)$$

Where:

FV = Future Value

A_t = Start Value

t = references time, here years

n = years in the future

e = the base of the natural logarithms

r = the rate of return (or rate of growth)

For example in Table I that follows, the average annual growth of the S&P 500 over a 68 year period (chosen for convenience) is given as 7.17%. That calculation is:

$$\frac{ln(2148.9) - ln(16.42)}{68} = .07168$$

The S&P 500 was 16.42 (daily average close) in July 1948 and in July of 2016 it was 2148.9. Utilizing the growth rate formula above the July 2016 level can be computed:

$$FV_{2016:7} = (A_{1948:7})e^{(.07168*68)}$$

$$2148.9 = (16.42)e^{(.07168*68)}$$

The arithmetic verification is left to the reader.

Trend Measures

A second methodology involves a comparison of two forecasting methods and their profiles. Here the procedures suggested by Diebold [1] are roughly followed, producing models that generate deterministic and stochastic trend models that suit the purposes of this exercise.

RESULTS

Descriptive Summary

Table I: Annual Percentage Returns Over the 68 Year Period, July 1948 - July 2016

Decade/ Period	*S&P 500*	*S&P 500 Total Returns*	*Inflation Adjusted S&P500*	*Inflation Adjusted Total Returns*
1950s	12.73%	16.39%	10.53%	14.27%
1960s	4.34%	6.13%	1.85%	3.70%
1970s	1.68%	3.57%	-5.42%	-3.48%
1980s	11.74%	13.41%	6.76%	8.35%
1990s	14.11%	14.96%	11.22%	12.06%
2000s	-2.52%	-1.94%	-5.01%	-4.45%
2010 - 2016	10.17%	10.79%	8.56%	9.19%
Full Period 1948-2016	**7.17%**	**8.89%**	**3.80%**	**5.50%**

(Decade returns are generated December over December, e.g., December 1949 to December 1959 for the 1950s. All returns are measured as instantaneous rates.)

Table I contains rates of return for the S&P 500, the S&P 500 with dividends reinvested (total returns above), in both nominal and real (inflation adjusted) terms. The deflator for real returns

is the Consumer Price Index. The choice of decades is, of course, arbitrary. The table reveals that the decades of the 1950s and the 1990s were periods of relatively high returns in both nominal and real terms. Both of those decades were characterized by relatively low inflation. Though nominal returns were positive in the 1970s, real returns were negative due to the inflation of that decade. The 2000s were a decade of negative returns in both nominal and real terms. Note that in the period from 2010 until July of 2016 the returns are quite strong across all measures, but those gains follow a decade of losses.

Trends

This section centers on trends. Definitions are useful to distinguish the two types of trends entertained here: (1) *deterministic trends* can deviate from the long-run trend, but eventually return to that trend; (2) *stochastic trends* have random components, and therefore no tendency to revert to a long-run trend—a new trend can start at any time and continue at any new rate. These different notions have important implications for forecast profiles.

A common first step is choosing how to characterize a time-series is often to stabilize the variance of the series.

Figure 1: S&P 500

Figure 1 depicts the S&P 500 from 1960 (chosen for convenience) until the most recent monthly realization of the series at the time of this writing. Clearly, the variance of the series is secularly increasing.

Now consider Figure 2, in which the same series is shown on natural log form.[1] The variance of the series looks to be roughly constant, and the series seems more or less linear. That latter characteristic will be important in considering possible trends. Though here the focus in on the S&P 500 in levels, see Figure 3 in which the S&P 500 with dividends re-invested is also shown in log form. Movements in the two series are, as would be anticipated, very similar.

Figure 2: S&P 500 in Log Form

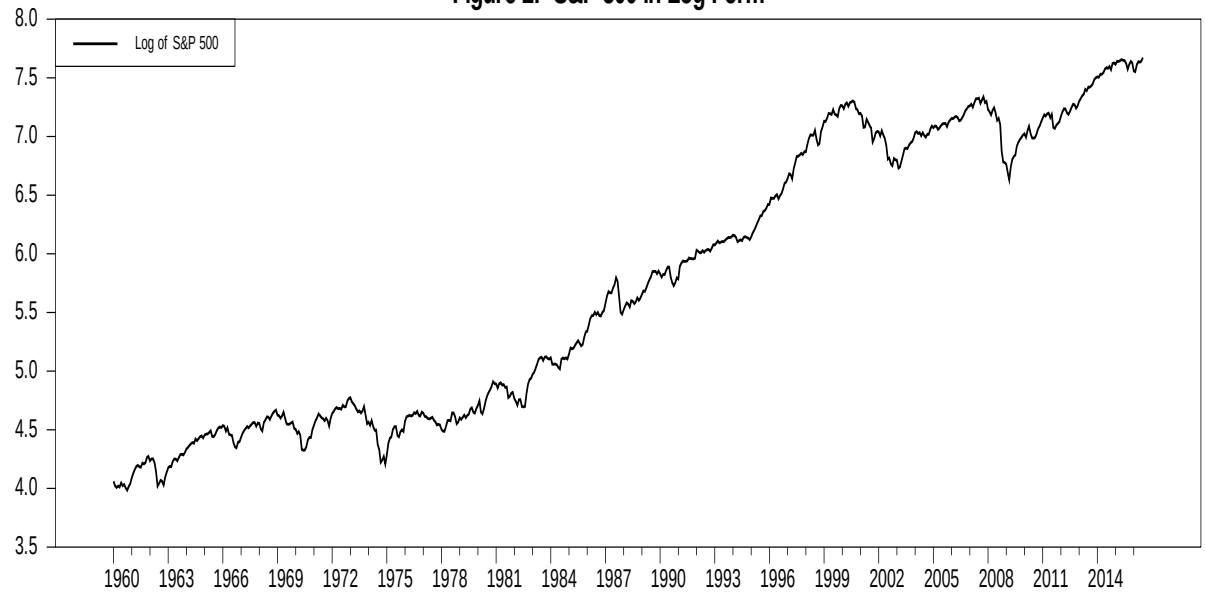
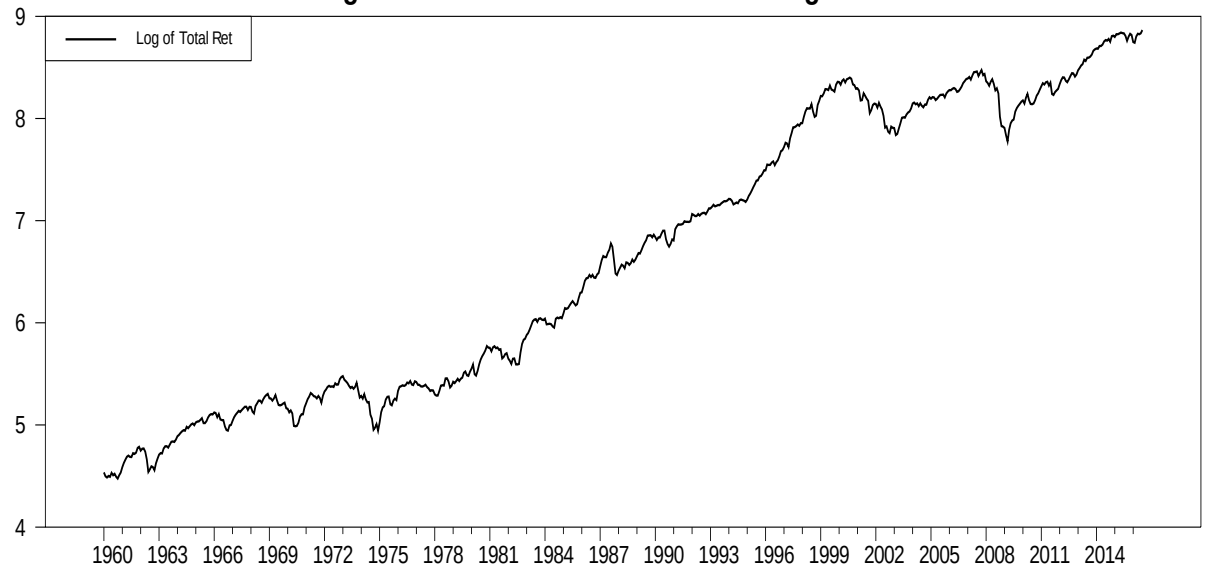


Figure 3: S&P 500 Total Returns in Log Form



[1] Other transformations, such as the square root are also candidates for stabilization of the variance. The natural log appears to be the optimal transformation of this series.

Having stabilized the variance of the series, the next step is to choose a trend characterization, eventually to be used in forecasting. Often such a model is chosen on the basis of *complexity penalized likelihood selection criteria*. These calculations take into account the fit of the model and the complexity (number of estimated parameters). Better fit is rewarded and greater complexity is penalized, as more complex models have been shown to produce inferior forecasts. The two criteria are the Akaike information criterion *(AIC)* and the Schwarz information criterion *(SIC)* represented as follows:

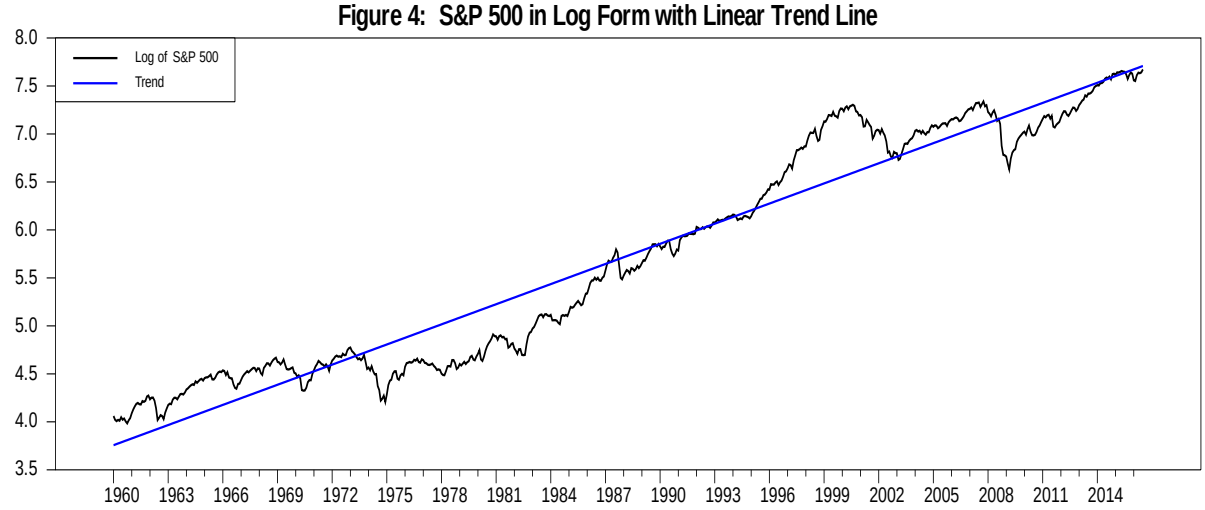
$$AIC = (2k / T) + \log(\sigma) \tag{2}$$

$$SIC = [k \log(T) / T] + \log(\sigma), \tag{3}$$

where k is the total number of estimated coefficients, T is the number of usable observations, and σ is the scalar estimate of the variance of the equation's disturbance term.

Inspection of the series in figures 2 and 3, suggest considering a simple trend and, perhaps, a quadratic trend for either the simple S&P 500, or the total returns series. The *AIC* and *SIC* return nearly identical measures for the two models entertained. However, when any cyclical characterization (see below) of either series is included, the simple trend is the clear choice. Figure 4 shows a linear trend fit to the log of the S&P 500.

Figure 4: S&P 500 in Log Form with Linear Trend Line



The regression line in Figure 4 is, of course, a semi-log regression since the *regressand* is in log form and the single *regressor* (the time trend) is untransformed. The slope coefficient from such a regression is an estimate of the rate of growth. This is easily seen by taking natural logs of both sides of equation 1:

$$ln(FV_{t+n}) = ln(A_t) + rt \tag{1'}$$

The estimate of interest is *r* and that represents the rate of growth of the series, here the S&P 500. Since the series employed here is a monthly series, the estimate of *r* is simply multiplied by 12 to convert to the more familiar annual rate. The actual estimation is:

$$\text{S\&P 500} = 2.9236 + 0.0058277514(t) \qquad (4)$$
$$(t_{\text{score}} = 100.25)$$

$$\overline{R}^2 = .937$$

$n = 679$ (months)

So the estimated annualized instantaneous growth rate is almost exactly 7 percent ($.00583 \times 12$). The identical procedure for the S&P series with reinvested dividends yields an estimated annual return of 8.3 percent. Interestingly, the most recent value of actual series is very close to the estimated trend. Clearly, such a result depends on the end date of the regression. The most recent value of the S&P with reinvested dividends is also close to its estimated trend, though a bit more below trend than the simple S&P.

Some researchers have suggested that the S&P 500 (or any index for that matter) is subject to seasonal variation, often some type of a "January effect." Most observers would not expect seasonal influence. Here I test with eleven seasonal dummies, one less than the number of seasons since all of the estimations include an intercept (constant) term. The seasonality of the series can be judged by the *AIC* and the *SIC*, and by an F-test to see if exclusion of the seasonal dummies significantly raises the explained variance of the equation.

The *AIC* and the *SIC* "choose" the model without seasonal components, suggesting that the S&P 500 is not seasonally influenced. Also the F-test of the null hypothesis restriction that all of the estimated coefficients on the seasonal dummy variables are jointly zero cannot be rejected. Formally,

H_o: $\beta_{s1} = \beta_{s2} = \ldots = \beta_{s11} = 0$
H_a: Some $\beta_{si} \neq 0$

H_o cannot be rejected, again confirming that the S&P 500 is not subject to seasonal variation.

The conclusions reached thus far are that the best trend is a simple trend fit to the natural log of the S&P 500 (or the S&P with reinvested dividends) and that the data are not subject to seasonal variation.

A Deterministic Trend Model

To produce a desired deterministic trend model here, a first-order autoregressive term is added to the simple trend model estimated above.[2] Note that this is not intended to serve as some sort of

[2] The autoregressive term in this estimation is dominant in terms of statistical estimation, but the model performs nicely as a deterministic trend. Any and all of these equation estimations are available from the author on request.

final forecasting model, but rather as a comparison to the stochastic model that follows in the next subsection. Recall that a *deterministic* trend will return to some long-term trend, such as the blue line in Figure 4. Suppose we estimate the model including the autoregressive term through January of 2001, a peak month for both the S&P 500 and the total returns series. From that point, monthly forecasts are produced through July 2016. Note that the forecasts tend to return slowly to the simple (long-term) trend. Also, the blue trend line would be slightly steeper if that line were estimated through 2011, rather than through the end of the data set. Here the total returns series in log form is shown; the forecast profile is similar for the S&P 500 series (Figure 4).

Figure 5: S&P 500 Total Returns with Trend and Deterministic Forecasts, Ver. 1

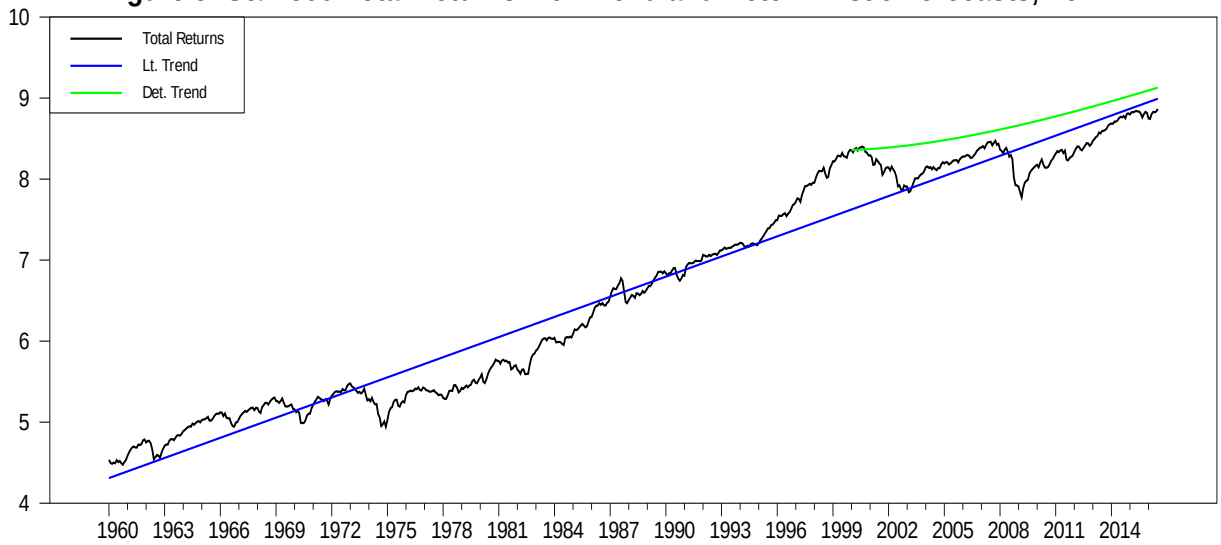


Figure 6: S&P 500 Total Returns with Trend and Deterministic Forecasts, Ver. 2

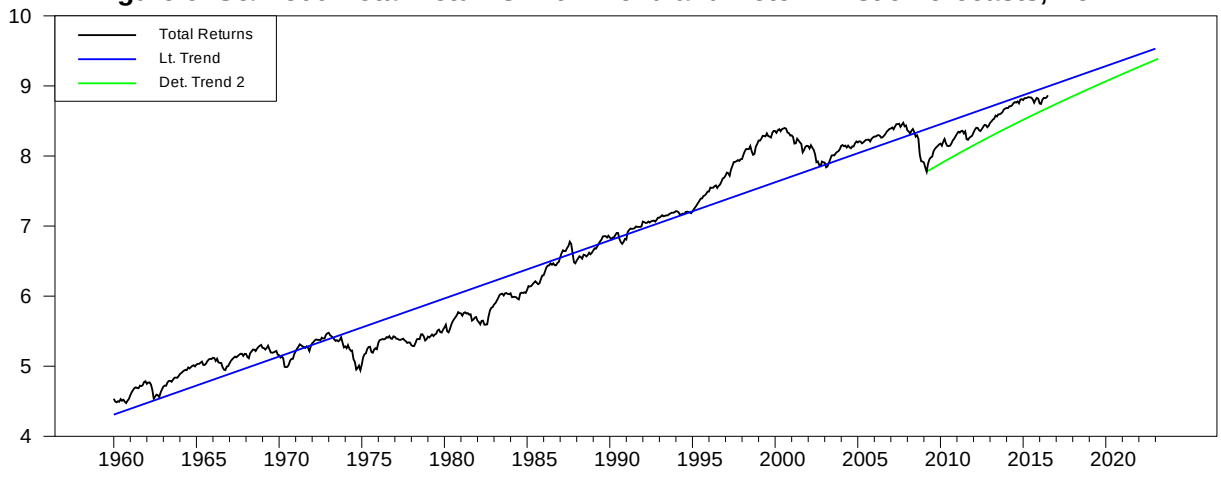


Figure 6 contains the forecasts with the origin at the relative low in March of 2009. Again, the forecasts return toward the long term simple trend which is extended past the end of the current realizations. In this case, if the (blue) trend line were computed through March of 2009, the slope

would have been flatter with the forecasts moving closer still to the long term trend. Choosing relative maxima and minima for this exercise can be critiqued as "cherry picking," since such origins will demonstrate the return to trend most clearly. Evaluation of the exercise is left to the discretion of the reader.

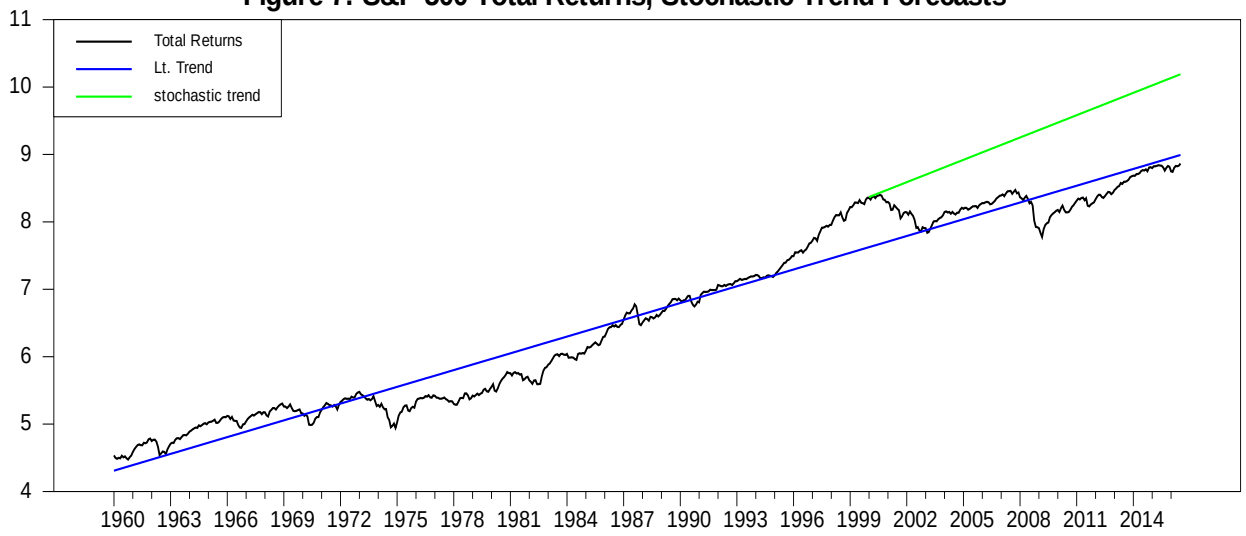
A Stochastic Trend Model

A *stochastic* trend, as described above, has random components and therefore no tendency to return to any long term trend—a new trend can begin at any point and continue at some new rate. Many (most?) researchers suggest testing time series for what are known as unit roots. Unit root tests indicate whether a series should be differenced before modeling the series. For the record, both the S&P 500 and the S&P with reinvested dividends series were tested. In each case the null hypothesis that the series contains a unit root is not rejected at traditional levels of alpha. It is also agreed among statisticians that the null hypothesis is maintained too often in such tests and that even if a series contains a unit root, one should not always impose it. Further, Perron [2] has shown that many series (including stock prices) thought to contain unit roots are in fact trend stationary with structural breaks.

Here the model in differences is estimated, with particular interest in the forecast profiles. This is a stochastic trend model. The particular estimation employed here is a moving average model of order one. The diagnostics are very good for such a model for either of the series (again, the full diagnostics of the model are available from the author on request).

What are the forecast profiles for the MA(1) model in differences? Figure 7 gives the out-of-sample forecasts, based on the same forecast origin as that in Figure 5.

Figure 7: S&P 500 Total Returns, Stochastic Trend Forecasts

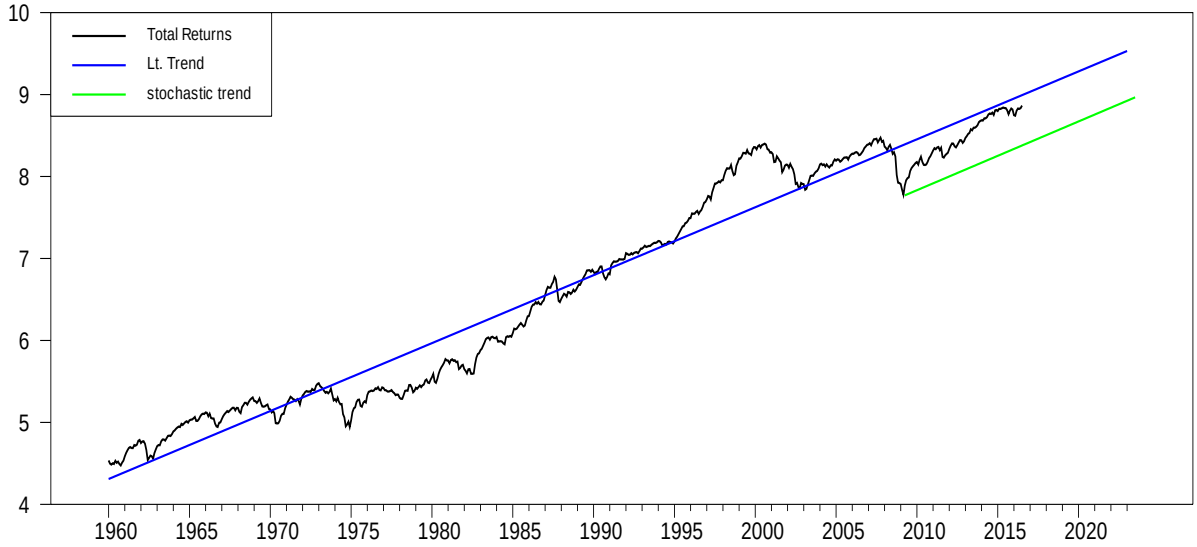


As noted above, the stochastic trend model does not return to trend in contrast to the deterministic trend model in Figure 5. Clearly in this case, the deterministic trend model would be a better approximation of the longer-term values of the series. Once more the reader is

cautioned that the relative maximum is chosen for a start point. Suppose we now choose the relative minimum as a forecast start point as in Figure 6. That forecast profile is depicted in Figure 8. The forecasts from the deterministic model of Figure 6 are again clearly superior, at least in the near term as compared to those of Figure 8.

Suppose the origin for the forecasts was some point in which the series was approximately on the blue long term trend line, perhaps the series level at the time of this writing. The forecast profiles would be similar for either a deterministic or a stochastic model. So gentle reader (if I may summon Miss Manners), which do you prefer?

Figure 8: S&P 500 Total Returns, Stochastic Trend Forecasts



In the interest of cogency, not all possible series and forecast profiles are presented. Those other results provide similar comparisons. The results show here are illustrative—not exhaustive.

A Long-term Investor

Suppose we take seriously for the moment the estimations of this exercise. Further suppose investors have forecast profiles of 10, 15, and 25 years. The following table suggests the future values of $1 (or $1 million for that matter) invested in the S&P 500 for the specified number of years. These forecasts are based on the long-term trend estimates of 7% for the S&P 500 and 8.3% for the S&P 500 with reinvested dividends. Though these estimations assume the deterministic trend model holds, based on the performance of the S&P 500 series from 1960 to the present, some heroic and some not so heroic, conclusions may pertain. First, time matters and matters greatly. If investors secure positions early, in 25 years $1 will grow to almost $6 at estimated growth rates for the S&P 500. Second, reinvestment matters and matters greatly. That same $1 would grow to almost $8 if dividends were reinvested and the estimated growth rate applies.

What about real rates of growth? A simple answer might be to suggest that future inflation will average 2%, the widely acknowledged current target of the U.S. central bank.[3] That would put real growth rates at approximately 5% and 6.3%, respectively for the S&P and the Total Returns series. None of the analysis in Table II or elsewhere in this paper gives consideration of brokerage fees or tax implications.

Table II: Future Values of Investment of $1 in the S&P 500, Based on a Simple Trend

Index \ Horizon	10 years	15 years	25 Years
S&P 500	$2.014	$2.858	$5.755
S&P 500, Total Returns	$2.293	$3.473	$7.965

There appear to be historical reasons for some degree of confidence in the estimates given in Table II. Here also are some reasons to treat these estimations with significant skepticism. Even if the trends are accurate as computed, one might expect the S&P 500 without reinvested dividends to grow *faster*, because the dividend rate has fallen secularly. That is, if the total returns series is to continue its growth path, a faster growing S&P 500 will be required to offset smaller dividend reinvestment.

However, there are also reasons to anticipate slower growth in either series. Since the estimates in Table II are based on nominal rates, and most observers anticipate lower future inflation than that over the past 60 years or so, for real rates of return to be maintained, slower nominal growth would be required for any stock or index. Second, most economists anticipate slower future economic growth for many reasons. Two important factors are (1) the US is further along the economic growth path and the neoclassical growth model suggests that more mature economies grow more slowly, and (2) the labor force in the US is also expected to grow more slowly, contributing to a slower overall growth rate. This argument assumes that the stock market is related to macro economic performance, an intuitively appealing proposition, but one not so easily proven.

CONCLUSIONS AND SOME QUALIFICATIONS

Several conclusions can be drawn from this exercise. First, the performance of the S&P 500 (or the S&P 500 with reinvested dividends) has been uneven in the post war era. Divided by decades, two decades saw significant declines in real returns; while other decades experienced strong returns in both nominal and real terms. Second, a fitted trend to the natural log of the S&P index or the same index with reinvested dividends reveals that these measures are approximately on trend at the time of this writing (September, 2016). A third conclusion is that a deterministic model performs better than a stochastic trend model from forecast origins that deviate from the longer-term trend.

Some important qualifications also should be considered. As emphasized above, choosing forecast origins that are either below or above trend gives advantage to a deterministic trend

[3] The FED target is core inflation measured by the PCE deflator, not the CPI.

model. However, some researchers expected the trend of, say, the 1990s to continue far into the future. The conclusion that the indexes chosen are on trend does not mean that the market is at the "correct" level. Many observers (Shiller for example) believe the current market is significantly over-valued at the current level for a number of defensible reasons, including price-to-earnings ratios and more. Others anticipate much faster growth. This work adds little to such a debate. This exercise also adds nothing to the practice (sorcery?) of predicting the market on a short-term basis. The argument that the market depends in the short-run on unpredictable news is (to this observer) compelling. Longer term, shocks to the real economy will doubtless play an important role in the future path of stock markets. Such shocks are, of course, by definition unpredictable. As one market watcher opined, "Stock prices in the short run used to depend on what you think I think, but today the market is more sophisticated, stock prices now depend on what you think I think you think." Enough said.

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UNDERSTANDING THE IMPACT OF PERCEIVED COMMUNITY IMPACT AND MEDIA INTEREST ON ENVIRONMENTAL SPILL REPORTING

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ABSTRACT

The National Response Center (NRC) data base offers a unique insight into the intentions of companies when the report Oil Spills and Hazardous Material Releases. Given that most firms routinely advertise and state their concern for the environment, when the opportunity occurs to report the impact or interest to the community, it is not done. Less than 1% of the reports from 1990 to 2015 anticipate community or media interest for an incident yet, they spend twice as long, 13 versus 7 minutes, reporting the incident. This suggests that there is something they are concerned about and they either wish to disclose more information in anticipation of increased scrutiny, or to protect the organization by being more transparent than they ordinary are. Several reasons for this phenomenon are possible and need to be researched in more depth, but it is likely that the individual making the report wishes to be more forthcoming in the report to protect themselves should the media or community become involved.

Introduction

Many industrial and other types of businesses in the United States operate with the use of oils and chemicals in their day to day operations. The operations are well regulated and controlled, and accidents do not happen very often yet, when they do, there is potential for an environmental impact on the local community and in more extreme events, a broader regional area (i.e. a Black Swan Event). Many well reported black swan events such as Exxon Valdez, Texas City Refinery disaster, and Deepwater Horizon had billions of dollars of environmental impact for clean-up cost and liabilities. Importantly, the Federal Government has established reporting standards for oil spills and hazardous substance releases that when federally mandated limits are exceeded, the event must be reported, not just black swan type events. While not routine, enough oil spills and hazardous chemical releases occur each year that the federal government has established the National Response Center (NRC) as the single point of initial contact for reporting, documenting, and coordinating federal, state, and local resources.

Initial reports are made as soon as an oil spill or hazardous waste discharge occurs, is discovered, or found by a third party. The initial report begins the process of alerting responsible government agencies at the Local, State, and Federal levels to align and put in place the right people and equipment to deal with the problem, it does not require the reporting agency, company, or person to be in possession of all the facts nor provide anything close to complete information about the incident. The relationship between

industrial businesses and the natural environment in the United States has somewhat of a spotty history given the amount of Superfund sites still in existence. Superfund sites are polluted locations requiring a long-term response to clean up hazardous material contaminations, designated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. Given the potential for liabilities and the societal pressure to protect the natural environment from the impact of dangerous substances, businesses and regulatory agencies such as the Environmental Protection Agency (EPA) have developed processes how to manage environmental spills and its reporting. Thus, our study seeks to use the National Response Center (NRC) Database Data to investigate the extent to which oil spill and hazardous material initial reports are useful in alerting the public to potential danger and environmental impacts.

Following the introduction, we outline the research study, provide a background of the NRC database and present our basic findings. Conclusions and limitations to the study follow.

Overview of the Research Study

Organizations engage in strategic actions to receive support from their stakeholders such as employees, customers, and the communities in the vicinity of their operations. Organizations engage in strategic actions to receive support from their stakeholders such as employees, customers, and the communities in the vicinity of their operations. Organizations need to gain legitimacy by aligning with the norms, values, and social expectations of their stakeholders [1], as well as to secure resources needed for firm operations [2-4]. In addition, researchers have argued that reputational capital can be built by a firm that adjusts to the social values of its salient stakeholder groups [2, 5-8]. A social value mutually expressed by many different stakeholder groups impacting firm operations is the protection of the natural environment, and the reduction of the ecological "footprint." When firm operations cause harm to the natural environment and create environmental emergencies, the events are usually well publicized and have the potential to create a substantial negative impact on firm financial performance.

In this research study we investigate the firm actions during the environmental spill reporting process. We utilized data retrieved from the National Response Center's (NRC) database of environmental spill incident reports. The available data included 751,032observations/calls over 27 years with a total of 253 variables for each observation. The NRC is the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories. In addition to gathering and distributing spill data for Federal On-Scene Coordinators and serving as the communications and operations center for the National Response Team, the NRC maintains agreements with a variety of federal entities to make additional notifications regarding incidents meeting established trigger criteria.

For the Environmental Protection Agency (EPA), the NRC receives incident reports under the Federal Response System (FRS) which is supported under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Clean Water Act,

Clean Air Act, and the Oil Pollution Act of 1990. The NRC disseminates reports of oil discharges and chemical releases to the cognizant EPA Federal On-Scene Coordinator [9]. The EPA is the federal authority commissioned to protect the natural environment (air, water, and soil), and therefore the living conditions of the general population, from the polluting effects of industrial activity [10].

The research question we ask is how do business representatives conduct and prioritize their actions in the environmental spill reporting process, and what the potential motivators of such actions are.

RELEVANT LITERATURE

Resource Dependence Theory

The idea that resources are finite and businesses are constricted and influenced by their external environments to acquire said resources is widely accepted ([11]. In the context of environmental performance, firms are impacted by governmental regulations based on laws enacted to protect the natural environment and other stakeholders (e.g. Clean Air Act, Clean Water Act, Occupational Health and Safety act, Pollution Prevention Act, etc.), as well as public discourse about firm operations when trying to obtain building permits, community support, and other issues controlled by state and local governments.

One of the resources needing to be acquired by any organization is the capital to invest in new business opportunities. Large public firms rely heavily on external capital markets to invest in future growth. Internal adjustments for efficiency are not enough to ensure firm survival [12], so firms depend on the external environment to secure resources for future growth and operation. The firms that manage their stakeholders best are the ones securing resources with ease.

Stakeholder Management

Stakeholder theory suggests that managers need to consider the interest of all their constituents, not only the interest of the shareholders ([13]. Even though the economic performance of the firm is a cornerstone, the interests of other stakeholders need to be addressed to ensure firm support and survival.

Since firms do not exist in a vacuum, they have to actively manage their stakeholder relationships through their actions and responses. Empirical work has shown that stakeholder management is a multidimensional construct that has direct effects on firm performance, as well as moderating effects on the relationship between firm strategy and firm performance [14].

Stakeholder management is important for its upside potential to increase firm performance, as well as to avoid downside risks. It helps to avoid more regulation and explicit contracts that increase the cost structure of a firm, because monitoring abidance of the rules tends to tie up valuable resources. In the worst case scenario, the legitimacy of the firm's existence is at stake if firm actions and outputs are not "consistent with the value

pattern of society" [15]. Therefore, firms need to pro-actively ensure that no harm comes to stakeholders, rather than reactively managing the fallout if salient stakeholder claims go unanswered. In the context of environmental spill reporting, research found that credible communication about the natural environment protected firms from the financial fallout of an environmental spill (17).

Reputation

Unlike small business reputation that is closely linked to the individual reputation of the firm's owner, in larger corporations the corporate entity develops its own reputation. The process is crafted and managed by the mission, vision, and organizational culture of the firm. Individual reputation is defined as "an agreed upon, collective perception by others, and involves behavior calibration derived from social comparisons with referent others that results in a deviation from the behavioral norms in one's environment, as observed and evaluated by others" [16] [16] [16] [16] [16](18). Corporations are treated as people in many aspects of the legal system and the corporate reputation derives, similar to the individual reputation, out of firms' key stakeholders' perceptions. To keep and improve a firm's positive reputation, the company needs to manage risk and avoid negative reports.

Managing Risk

Risk management in most business areas does not yet have well documented best practices or standards [17]. Firms may minimize risk by rehearing oil spill or hazardous release incidents, clarifying roles and responsibilities, educating and communicating to employees the values of the organization but, how well these values and training have taken hold would be reflected in the content of the NRC initial report. Further, most organizations might or should have a Social Media (SM) Policy in place. This policy is a statement that delineates a employees rights and responsibilities [18]. Basic SM policies would suggest that employees disclose, protect, and use common sense when communicating outside of the organization. In dealing with a NRC reporting incident, the employee responsible for making the report is going to be worried about reporting in a timely manner, confirming the accuracy of the information available in a short period of time, and deciding what information can be shared later or if at all. The key concerns would be to anticipate mediate and community interest and avoid suggestions of cover-up or a lack of transparency.

It is also clear that firms would have a vested interest in being transparent in their reporting to protect their reputations. Yet clearly, it would be in a firm's best interest to minimize the impact of an oil spill or hazardous material release by positioning the event as a routine or normal incident which is just the cost of doing business.

The point we are going to make is essentially that firms are not in it for the protection of the natural environment per se, but they care more about being "caught" and the visibility their spills have. This needs to be outlined by the data since they are so much more diligent in their reporting when the reporting agent expects media interest and community impact.

METHODS

National Response Center Data Base

By law, any person or organization responsible for a hazardous material release or oil spill is required to notify the federal government when the spill amount reaches a federally-determined limit. These limits are based upon the quantities of oils harmful to public health or the environment. The Environmental Protection Agency (EPA) has established requirements to report oil spills to navigable waters or adjoining shorelines that violate applicable water quality standards, cause a "sheen", "film", or discoloration of the surface of the water, or cause a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

For releases of hazardous materials, the federal government established Superfund Reportable Quantities (RQ's). When a hazardous material release equals or exceeds its RQ, it must be reported. Under the Emergency Planning and Community Right-to-Know Act (EPCRA), the federal government created a list of several hundred extremely hazardous substances based on their acute toxicity. Under the law, releases of these extremely hazardous substances trigger reporting requirements to state and local authorities, as well as the federal authorities.

The National Response Center (NRC) is a part an extensive federally established National Response System and staffed 24 hours a day by the U.S. Coast Guard. It is the sole national point of contact for reporting all oil, chemical, radiological, biological and etiological discharges into the environment, anywhere in the United States and its territories. The NRC also takes maritime reports of suspicious activity and security breaches within the waters of the United States and its territories. Reports to the NRC activate the National Contingency Plan and the federal government's response capabilities (https://www.epa.gov/emergency-response/national-response-center). It is the direct responsibility of the NRC staff to notify the pre-designated On-Scene Coordinator assigned to the area of the incident and to collect available information on the size and nature of the release, the facility or vessel involved, and those responsible for the release. The NRC maintains reports of all releases and spills in a national database (http://nrc.uscg.mil).

Reporting organizations or individuals are asked to report as a minimum:

- Your name, location, organization, and telephone number
- Name and address of the party responsible for the incident
- Date and time of the incident
- Location of the incident
- Source and cause of the release or spill
- Types of material(s) released or spilled
- Quantity of materials released or spilled
- Danger or threat posed by the release or spill
- Number and types of injuries (if any)
- Weather conditions at the incident location

 Any other information that may help emergency personnel respond to the incident

In addition to gathering and distributing spill data for Federal On-Scene Coordinators and serving as the communications and operations center for the National Response Team, the NRC maintains agreements with a variety of federal entities to make additional notifications regarding incidents meeting established trigger criteria. For the Environmental Protection Agency (EPA), the NRC receives incident reports under the Federal Response System (FRS) which is supported under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Clean Water Act, Clean Air Act, and the Oil Pollution Act of 1990. The NRC disseminates reports of oil discharges and chemical releases to the cognizant EPA Federal On-Scene Coordinator [9]. The EPA is the federal authority commissioned to protect the natural environment (air, water, and soil), and therefore the living conditions of the general population, from the polluting effects of industrial activity [10].

The NRC database was established in 1990 and contains approximately 250 plus variables that expand upon the basic information above. Of interest to our study are two self-reported measures, community interest and media interest. These variables are simple "yes" or "no" fields. It should also be noted that many of the database fields are left blank or labeled unknown. The notification speed of the report is of more value than the accuracy or completeness of the report. The NRC does not go back and correct any errors, and in fact, if the reporting agency or person requests to make a substantial change in the data, a new database case is begun. There is no way reasonable way to determine how often this occurs but conversations with NRC staff suggests that this is an infrequent occurrence. While the incompleteness and accuracy of the data has its own issues, the immediacy of the information being submitted, provides clues into the risk assessment training and organizational culture of the reporting agency or individuals making the report related to environmental impact.

The Community Interest Risk Assessment Matrix

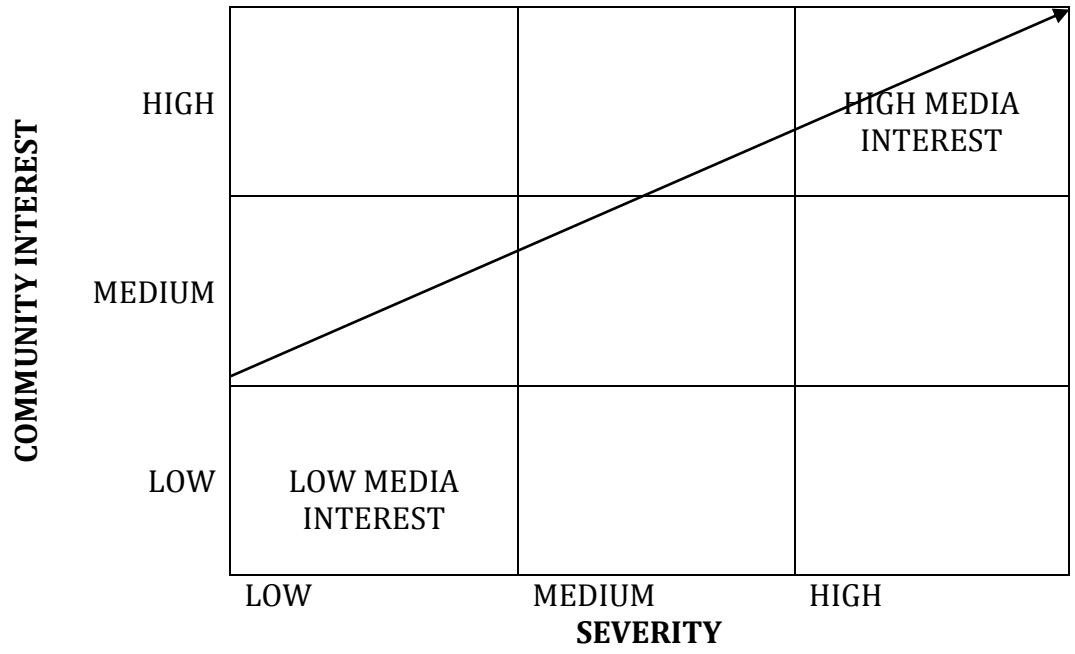
Figure 1 suggests a relationship between the extent to which a community would be interested in an oil spill or hazardous material release that would impact their health and well-being based and the severity of the spill or release. Further, the extent to which a community would be interested in the impact of an oil spill or hazardous material release would generate some media interest. Figure 1 suggests that if an oil spill or hazardous release were severe enough, community interest and media interest would be higher.

Community Impact as explained in the NRC Data Dictionary is defined as "Indicates if a community was affected by the incident (Yes or No)." Media Interest is defined as "Indicates the three levels (Low, Medium, and High) of news media interest of the incident. Can be convert to a binary variable as well. Severity of an oils spill or hazardous material release can be adjudges based on the number of injuries, deaths, size, and other impact variables found in the database. These measures are reported at the time of the report by the responsible organizations or individuals and reflect their organizational view or personal view of the current circumstances. Thus, they are reporting what they expect to

happen and not what may happen in the future. We believe this provides an important context to evaluate the NRC data.

Figure 1 suggests a risk assessment by organizations. If the spill or release is small and easy contained and corrected, then there would be little or no community interest. As the severity of the impact increases the potential for media interest and community interest grows. Figure 1 suggests a continuum from low to high on each axis. It is suggested that there may be incidents which have little severity but may be flash points for the local area that raises ongoing concerns. For instance, a company may have reoccurring small discharges in a local stream. Overtime, in terms of severity, there may be enough re-occurring incidents that the local population is numb to one more instance. It's not until there is one spill to many that community interest goes higher. In terms of severity, certain jobs are dangerous and accidents are routine or even expected. In this case, severity may be high but, community interest is low because it's the nature of the work. Media interest could be a fickle thing. Airplane crashes routinely generate news but a railroad car crash might go unreported. It should be clear that if community interest were high and severity were high, the likelihood of media interest would increase.

Figure 1: Community Interest Risk Assessment Matrix



Accidental releases of potentially harmful materials happen in the US all the time. The vast majority of spills are small and well contained at the site of the industrial operator. Nevertheless, businesses have to follow well defined reporting processes when a spill occurs, regulated by the EPA and implemented by the National Response Center (NRC). The NRC maintains a record of all of these reports and makes the results available to the general public with the National Response Center Database. In this study we investigate business communication in their reporting of the environmental emergencies.

DATA ANALYSIS

Raw data was collected from the National Response Center (NRC) website for the years 1990 through 2014 resulting in a dataset of 269 variables and 777,947 cases. Each year consisted of ten separate spreadsheets labeled Calls, Incident_Commons, Incident_Details, Incidents, Material_Involved, Material_Involved_CR, Trains_Detail, Derailed_Units, Vessels_Detail, and Mobile_Details. Relevant variables from these worksheets were then combined into a single Excel spreadsheet using AbleBits, an MS Excel Plugin tool, using the individual report "Sequence Number" (SEQNOS) variable as a unique identifier to combine the data. The SEQNOS variable is a unique variable that identifies each individual call made to the NRC and uniquely identifies each row in each of the spreadsheets. The Excel Data was then imported into IBM SPSS Statistics 22 for processing and analysis.

The data set was then systematically reduced to identify variables that might have an impact on news worthiness. A key variable, "Media Interest" was selected as a dependent variable. The dataset from 1990 through 2014 contains 751,032 individual records with sequence numbers (SEQNOS) ranging from 1 to 1,110,662. Missing SEQNOS Numbers are assumed to be practice drills, but this has yet to be verified. There are 253 different variables many of which are empty spaces or are marked unknown. The data set contains numerous spelling and data entry errors. Data cleaning is still ongoing and data presented should be considered very preliminary.

The dataset was then reduced by deleting the years 1990 through 1999. The Community Interest and Media Interest variables were not used in the early years. The data set was greatly simplified to look for variables that could be changed to binary variables. For instance, cases would track number of injuries or deaths, but for data analysis, it made more sense to convert these type of variables to "Yes' for injury and "no" for no injury. If an injury field was left blank or reported as unknown, we coded this field as a "no". This was done for a number of variables in order to use frequency counts and to look for relationships.

The 1990-2015 NRC data is self-reported data from the Federal Government (2.1%), Foreign Agency (0.0%), Local Government (1.0%), Military (1.0%), Private Citizen (4.4%), Private Enterprise (58.2%), Public Utility (3.0 %), State Government (0.3%0, and other (30.1 %). Data is reported to the NRC via FAX (0.0%), Message Traffic (0.5%), News (0.0 %), others (0.0%), Telephone (55.7%), Unavailable (41.2%), and Web Report (2.5%).

The average call length is 7:20 minutes with a standard deviation of 11:07 minutes. Media Interest was reflected in only 4,718 out of 484,954 calls or approximately 0.1 % of the total calls. An important result is that these calls lasted an average of 13 minutes as opposed to 7 minutes. This same relationship held true for Community Interest with only 767 out of 484, 954 (0.1%).

It was surprising to find so few calls where the organizations anticipated media interest or community interest.

LIMITATIONS AND CONCLUSIONS

Initial results suggest that organizations are not overly concerned with Media Interest or Community Interest. Those individuals making the initial NRC report are reporting what we believe to be routine Oil Spills and Hazardous Material Releases. Some preliminary other results suggest that incidents with a higher number of injuries or deaths lead to higher reporting of Media Interest and Community Interest.

It is thought that Oil Spills and Hazardous Material Releases happen frequently and as a result they are the cost of doing business and remain out of the realm of awareness of most individuals. Incidents that happen within an organization's protected boundaries pose little threat to the community or the environment. Local, State, and Federal response teams react quickly and professionally limiting any damage done. Thus, it would appear that organizations anticipate community Interest or Media Interest only when the risk to the firm is higher and there is a greater need to appear open and forth coming.

The NRC data base has misspellings, missing data, and unknown fields. This limits its usefulness but does provide an insight into how much is known at the outset of a reporting incident. It is this perspective that provides some insight into the true intentions of firms required by law to report Oil Spills and Hazardous Chemical Releases.

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Unintended Consequences of Corporate Average Fuel Efficiency (CAFE) Standards

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Abstract: One of the ways legislators in the United States try to lower greenhouse gas emissions, oil consumption, dependence of foreign oil, and gain a multitude of other benefits is by applying corporate average fuel efficiency (CAFE) standards to automakers. CAFE standards are laws that mandate automakers have to produce vehicles that are able to achieve a set average fuel efficiency. This research project gives examples of how manufacturers mined for legislative loopholes from around 1990 through the early 2000's and shows many of the unintended consequences of this legislation. Some manufacturers moved final vehicle assembly to another country, reclassified a passenger car as a light truck by changing the vehicle base, built more SUVs which were not classified as cars and not subject to gas guzzler taxes, added flex-fuel vehicles that could also run partially on gas mixed with ethanol, and added weight to a vehicle to change its classification. The paper examines added costs to consumers and suggests market-based alternatives to these standards.

USING REAL DATA TO ENHANCE LEARNING IN AN ACCOUNTING INFORMATION SYSTEMS COURSE

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ABSTRACT

Textbooks provide students with clear problems with specific correct and incorrect answers that often round to even numbers. Data in the real-world is not that pretty. Students need to learn to take raw data, organize it, and draw conclusions from it. According to the American Institute of Certified Public Accountants, critical thinking skills are important and will be tested more on the new Certified Public Accountants examination. Students need to be able to think critically and analyze data.

Over the last three years, I have partnered with non-profits to receive multi-year financial or quantitative data in Excel. In two cases, copies of financial statements and tax returns were also received. The projects began with the non-profit organization leader introducing their organization and its mission to the students. Some organization leaders suggested questions they would like answered from the data analysis. Students sign a confidentiality agreement and then begin working with the data. In groups, students determine how they will analyze the data. Project goals were broad allowing the students to determine how they would analyze the data and what key points they wanted to make.

Excel pivot tables and VLOOKUP skills were reviewed. Guidelines for formal business reports and presentations were provided. Students used these and other resources to organize the data. Students consulted other sources for related information when needed. In each case the students prepared a final written report and in two of the cases, the information was formally presented to the organization.

Students enjoyed providing helpful information to the organizations. Students also felt they had improved their Excel skills especially with Pivot tables. Students did not like that the information was unorganized or in varied formats. Students were frustrated by required rewrites of the paper to ensure it professional quality. Overall, both the students and the organizations found the projects to be useful.

VALUE CREATION THROUGH EFFECTIVE DEMAND-DRIVEN SUPPLY CHAIN MANAGEMENT: EMPIRICAL EVIDENCE FROM LONG-RUN STOCK PERFORMANCE

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ABSTRACT

Demand-driven supply chain management (DDSCM) has become a strategic weapon to create value for firms. However, the existing literature provides limited empirical support on the value creation of effective DDSCM. Building on the existing literature and the theory of dynamic capabilities, we hypothesize that DDSCM can create significant market value for shareholders. We use AMR's "Supply Chain Top 25" ranking to obtain a sample of firms independently identified as top performing DDSCM firms, and examine their long-run stock performance. The results show that investing in the portfolio of top DDSCM firms can generate significantly positive abnormal returns after controlling for a variety of factors to discount alternative explanations. To provide further evidence regarding the practical application of our findings, we investigate buy-and-sell abnormal returns and show that investors can earn significantly positive abnormal returns by simultaneously buying a portfolio of top DDSCM firms and selling a portfolio of matching firms.

1. INTRODUCTION

"We start at the store shelf and work our way back through our supply network", "The point is that you design your supply network all the way back to your suppliers in ways that allow you to focus on winning at the shelf", "Conceptually that is the big idea behind Consumer Driven Supply Network. We are being recognized in the marketplace as being more responsive to customer needs and being more proactive in creating value", says Keith Harrison, the global product supply officer for P&G.
(Procter & Gamble Uses Consumer Demand Info to Drive Supply Network, Supply Chain Brain, Feb. 1, 2006)

The supply chain is the central organizing unit in today's global industries [43]. Competitive advantage is derived from matching demand with the supply chain configurations [46] [36] [28] [17]. The above quote provides a glimpse on a management program developed by successful firms in linking actual demand to supply chain configurations. This management program is termed as demand-driven supply chain management (DDSCM). Conceptually, DDSCM is

referred to "a set of practices aimed at managing and co-coordinating the whole demand-driven supply chain, starting from the end customer and working backward to raw material suppliers" [22] [50] [63]. DDSCM involves building supply chains in response to demand signals, and it requires turning the supply chain on its head, taking the consumer as the starting point, rather than its final destination [1] [19] [20].

Multiple researchers argue that DDSCM has become a strategic weapon to gain advantages over peers [33] [28] [58]. It follows that tangible results, in terms of market valuations, may also be derived from effective DDSCM. Thus, from the contention that effective DDSCM is a key for value creation, the relationship between effective DDSCM and stockholder value emerges as an important topic that deserves investigation. However, while the literature generally agrees that DDSCM is a key for value creation, that same literature contains little in the way of empirical support [10] [21]. In the existing literature, Hendricks and Singhal [24] [25] and Hendricks et al. [26] investigate stock market reaction to supply chain disruptions, which indicate that firms' poor DDSCM could negatively affect firm value. Direct empirical evidence for the linkage between DDSCM and stockholder value is rare. In addition, recent studies adopt the theory of dynamic capabilities to explain that effective DDSCM can help firms sustain value creation over time [33] [37]. As a pioneer study in establishing the linkage between supply chain excellence and economic values, Swink et al. [56] provide descriptive statistics in comparing historical stock performances between top DDSCM firms and control firms. To the best of our knowledge, there is no empirical evidence for the effect of effective DDSCM on generating future economic earnings\stockholder value.

To close the gap in the existing literature, our study investigates the relationship between effective DDSCM and value creation by examining long-run stock performance of firms independently judged to have effective DDSCM. The research questions guiding this study are: ***Does DDSCM have a long-term effect on stockholder value? If so, what is the magnitude of this value?***

Being recognized in the American Marketing Association's "Supply Chain Top 25" is used as a proxy for effective DDSCM [56] [21]. First, we examine whether or not investing in the portfolio of top DDSCM firms can generate abnormal stock returns, after controlling a variety of factors, over different holding periods. This is the most important and direct evidence for the value creation through effective DDSCM. Second, we investigate whether or not the long-run performance of top DDSCM firms significantly outperforms that of matching firms. The results are robust with respect to different groups of matching firms. Our findings will provide new evidence for the relationship between effective DDSCM and long-term value creation for stockholders. Our finding will have widespread implications covering investors in financial market, supply chain managers, and researchers of supply chain management issues.

The remainder of this paper is organized as follows: Section 2 is comprised of literature review and statements of the hypotheses to be tested. Section 3 describes the sample collection and methods used for estimating the long-run stock performance. Section 4 presents our findings based on the empirical evidence. Section 5 concludes the study with discussion on findings and implications. In addition, Section 5 presents a further application and show that investors can

earn significantly positive abnormal returns by simultaneously buying a portfolio of top DDSCM firms and selling a portfolio of matching firms.

2. LITERATURE REVIEW AND HYPOTHESES Literature

2.1. Effective Demand-driven Supply Chain Management and Value Creation

With business environment becomes more turbulent, an ever-increasing number of companies have grown their interest in building up demand-driven supply chains as companies saw opportunities to create value/wealth through their managerial processes of matching supply and demand [27] [52]. Vollmann et al. [63] suggest using the term "demand chain management" to emphasize the shift from efficient supply to meeting the needs of the customer. This new concept has been supported by many scholars. For example, Treville et al. [60] state that differentiating from supply chain management that focus on efficient physical supply chains, demand-driven supply chain management (DDSCM) starts with the customers, working backward through the entire chain, to the suppliers of the suppliers [1] [50]. Hence, everything that is moved, handled or produced should ideally be in response to a known customer requirement [31].

In the literature, the theories proposed as a suitable theoretically foundations for DDSCM effectiveness primarily include the customer value based theory of the firm [54] and the theory of dynamic capabilities [59]. The customer value-based theory of the firm suggests that effective DDSCM creates value through providing effective customer value. Firms need to organize themselves around understanding customer needs and customer value delivery processes. The demand-driven supply chain can be seen as an organization which brings a variety of participants together for the specific purpose of facilitating customer value creating processes [31] [32].

The theory of dynamic capabilities provides a framework for understanding how a firm sustains wealth creation by achieving new forms of competitive advantages in a rapidly changing environment [59]. Dynamic capability is referred to the firm's capability to scan the environment, to evaluate markets and to quickly integrate, build, and reconfigure internal and external competences to match the requirements of a changing environment [13] [59]. Organizational practices/routines are critical sources of dynamic capabilities [59]. Effective DDSCM builds up dynamic capabilities in supply chain practices\routines to detect and respond to changes [33] [36]. For example, Simchi-Levi et al. [53] illustrates how effective DDSCM enables Dell to create four supply chains, Build-to-Order, Build-to-Plan, Build-to-Stock, and Build-to-Spec, each has different supply chain practices / routines and is dedicated to a different customer segment, addressing different dimensions of demand uncertainty and customer relationship. As a result, Dell has experienced a substantial business transformation and kept its leading position in its industry.

2.2. Empirical Evidence in Previous Studies

In the literature, empirical studies have examined the linkage between DDSCM and performance to demonstrate the value created by DDSCM. However, after synthesizing current empirical research, we found two major issues.

First, most studies so far have attempted to use survey-based data to investigate the linkage between the implementation of some individual DDSCM practices (e.g., IT infrastructure integration for DDSCM, customer relation options, supply chain integration, or supply chain collaboration) on one hand [6] [11] [19] [44] [49]; and some aspects of either supply chain performance (e.g., cycle time, on-time delivery) [30] [34] or firm performances (managers' perceptions of ROI, ROA performance relative to competitors) on the other hand [52] [57]. Cross-sectional and perceptual data is beneficial in providing first-hand information about contribution of specific DDSCM practice to performance. However, the limitations due to perceptual nature of the data used to assess the various constructs, reliance on key informants, and common methods variance that are common to many survey-based research studies of the past do apply to these studies as well.

Second, research on the long-term effect of DDSCM on value creation is just beginning to emerge. DDSCM research has theorized that DDSCM built upon dynamic capabilities are effective or effective in value creation and sustain [9] [33] [36] [37]. According to the theory of dynamic capabilities, the existence of dynamic capabilities can only be examined by changes over time [59]. Among the existing few studies, Greer and Theuri [21] focus on accounting-based measures of firm performance including cost ratios, activity ratios, and liquidity ratios. In contrast to accounting-based measures of firms' competitive performance, a couple of studies provoke research on long-run stock performance because such analysis can provide an estimate of the economic impact of a management program, reflecting not only the magnitude of market value created for shareholders, but also whether the value/performance can be sustained in the face of challenges over time [26]. However, so far these studies have focused on proving that firms' market value erodes if failing to manage supply chains effectively. For example, supply chain disruptions, indicators of a firm's poor DDSCM, cause significant negative economic impacts [24] [25] [26]. Whether or not effective DDSCM contributes directly to long-term stock performance has not been examined yet.

We recognize that there are multiple ways that can be used to measure the value of DDSCM, such as management perceptions, accounting-based performance measures (ROA, ROE), and stock-market-based performance. Each of the methods is subject to particular biases.

Melnyk et al. [40] point out that individual perceptions about financial impact of their respective firms' management decisions and actions are not particularly reliable. Accounting-based measures tap only historical aspects of performance [41]. Moreover, they are subject to bias from managerial manipulation and differences in accounting procedures [2] [3]. Compared with accounting-based measures, stock performance measures have several advantages: (1) less susceptible to differential accounting procedures and managerial manipulation; (2) represent investors' evaluations of a firm's ability to generate future economic earnings rather than past

performance [42] [48]. The primary problem with stock-based measures is that stock performance should be adjusted for risk, industry characteristics, and other variables so as to avoid confounding correlates [26].

2.3. Research Hypotheses

Given the debate over the proper measure of firm performance, this study uses long-run stock performance to investigate the value of effective DDSCM. Following finance literature, we examine long-run stock performance using different benchmarks and controlling for different factors. By doing so, we can not only overcome the limitations as discussed above, but also provide a more comprehensive estimate of the economic impact of effective DDSCM, reflecting not only the magnitude of market value that effective DDSCM can create for shareholders, but also whether the value can be sustained in the face of challenges over time. Building upon the theory of dynamic capabilities and the existing literature as discussed in previous sections, we advance the following hypotheses:

H1: Firms with effective DDSCM have significant and positive long-run abnormal stock returns.

More specifically, we compare a portfolio of top supply chain management firms as designated by AMR versus that of matching firms in terms of risk-adjusted performance. Reasons for using AMR's ranking for top DDSCM firms are discussed in next section for methodology. In this study, we mainly use the calendar time portfolio approach to measure risk-adjusted performance. The calendar time portfolio approach is well accepted in finance studies on long-run performance because it provides more reliable test statistics, especially at the presence of cross-sectional dependence [5] [14] [45].

Stock price changes can be a function of the changes in expected future cash flows as well as the risk or volatility of future cash flows [26]. After the portfolios of top supply chain management firms and matching firms are built, we first look into the Sharpe Ratio--a measure of performance adjusted for total risks [51]. Then, the Treynor Ratio is used to measure performance adjusted for systematic risks [61]. According to the theory of dynamic capabilities, firms with effective DDSCM have better capabilities in dealing with risks/changes. Therefore, we expect that:

H1a: The portfolio of effective DDSCM firms outperforms that of matching firms in terms of stock performance adjusted for total risks (the Sharpe Ratio is the measure of performance adjusted for total risk).

H1b: The portfolio of effective DDSCM firms outperforms that of matching firms in terms of stock performance adjusted for systematic risks (the Treynor Ratio is the measure of performance adjusted for systematic risks).

While Treynor ratio attempts to control for the systematic risk (i.e., stock's covariance with the overall stock market), more recent finance studies show that to detect abnormal long-run returns,

factors including market, size, book-to-market ratio, and momentum should be taken into account [7] [15]. These factors need to be controlled as potential confounding correlates. For example, in the finance literature, market is used as the indicator for the stock market performance; while book-to-market ratio is typically used as a proxy for firms' quality and growth potential. Firm size is a direct measure of firm resources (i.e., larger firms typically control more resources). Momentum in a stock is described as the tendency for the stock price to continue rising if it is going up and to continue declining if it is going down. Therefore, to control alternate explanations on the effect of effective DDSCM on long-term stock performance, we also look into abnormal returns after adjustment for the Fama-French three factors (market, size and book-to-market ratio are controlled) and Carhart four factors (market, size, book-to-market ratio, and momentum are controlled). Putting all of this together, we expect that:

H1c: The portfolio of effective DDSCM firms outperforms that of matching firms in terms of abnormal returns adjusted for market, size, and book-to-market factors (i.e., the Fama-French three factors).

H1d: The portfolio of effective DDSCM firms outperforms that of matching firms in terms of abnormal returns adjusted for market, size, book-to-market, and momentum factors (i.e., the Carhart four factors).

3. METHODOLOGY

3.1. Data

Data on effective DDSCM are obtained from American Market Research's yearly study on the "Supply Chain Top 25." AMR, a Gartner, Inc. company, focuses on the global supply chain and is well known among supply chain practitioners and researchers. Since 2004, AMR has annually conducted a "Supply Chain Top 25" study. In 2008, AMR extended the top list to 50 firms.[1]

We view inclusion in AMR's "Supply Chain Top 25" as a proxy for effective DDSCM for the following reasons. First, it is well-accepted in the literature that recognition by independent expert evaluators as being a top performer serves to indicate that the firm has effectively implemented the management program of interest [24] [25]. Second, evidence for the validity of AMR's evaluations comes from empirical studies regarding AMR ranking results as a reliable source to identify top supply chain firms [21] [56]. Third, the criteria that AMR study has used to rank top supply chains match with the conceptualization of DDSCM in this study. AMR requires the voting panelists to rank top supply chains based on the supply chains management routines/practices classified as the "orchestral level" in AMR's Demand-Driven Supply Network (DDSN) model. AMR's comment on Apple furnishes an illustration. Apple has been ranked No.

[1] For the year of 2008, we include those firms ranked from 26th to 50th as long as it is their first appearance on top list. Our results are also robust if excluding the firms from the study (i.e., firms ranked from 26th to 50th).

1 for three consecutive years in the Supply Chain Top 25 research. AMR analysts attribute Apple's success to its ability to break new ground in transforming a supply chain into a value chain by starting with the consumer experience and designing its network to serve that master first and foremost. Forth, it provides comparable data over an extended period.

The methodology for AMR Research to determine "Supply Chain Top 25" firms is as follows: First, AMR Research analysts derive a master list of firms from a combination of sources, including the Fortune Global 500, the Fortune 1000, and the Forbes 2000. The primary source is the Fortune Global 500, which is pared down to the manufacturing and retail sectors. Analysts then supplement this group with companies from the Fortune 1000 that fall between $10 billion in revenue and the smallest revenue on the Global 500 list, as well as select companies from the Forbes 2000. Second, a composite score is created for the firm to determine its ranking. There are three components that make up the composite score. The first component is publicly available financial data (ROA, inventory turnover, and sales growth). The second component is an AMR Research Opinion from an AMR Research voting panel. The third component is a Peer Opinion Panel comprised supply chain professionals. Public financial data gives a view into how companies have performed in the past, while the opinion component provides an eye to future potential and reflects future expected leadership, a crucial characteristic. These three components are combined to create a weighted average score for overall supply chain leadership.

The AMR Research voting panelists represent a variety of industry and functional specialties. Each draws on his or her primary field research and continuous work with companies. The goal of the peer panel is to draw on the extensive knowledge of the professionals that, as customers and/or suppliers, interact and have direct experience with the companies being ranked. Any supply chain professional working for a manufacturer or retailer is eligible to be on the panel, and only one panelist per company is accepted. Excluded from the panel are consultants, technology vendors, and people not working in supply chain roles (e.g., PR, marketing, finance, and the like).

Each voter from both the AMR Research Panel and the Peer Opinion Panel goes through a four-page system to get to her/his final selection of firms that come closest to the DDSN ideal (i.e., DDSN Level 4) as defined in AMR Research Reports. The first page provides instructions and the DDSN model against which voters are later asked to create their rankings. The second page asks for some demographic information. The third page provides the complete list of the firms to be considered. Voters are asked to choose 30 to 50 that, in their opinion, most closely fit the ideal. This is done by checking off the boxes next to those firms. The fourth page automatically brings up just those chosen firms. Panelists are asked to rank the firms from 1 through 25, with 1 being the firm most closely fitting the ideal in their opinion. AMR Research then tallies all the individual votes across the entire panel, with 25 points earned for a No. 1 ranking, 24 points for a No. 2 ranking, and so on.

3.2. Sample Construction

This study includes the "Supply Chain Top" firms in the AMR annual announcement from 2004 to 2008. We start at the year of 2004 because 2004 is the first year of AMR publication of

"Supply Chain Top 25" firms. We stop at the year of 2008 for two major reasons: first, we want to look into the long-run stock performance, i.e., 12 months and longer; second, given the special situation of year 2008 (i.e., global financial crisis), it's a good time to test the effectiveness of a firm's DDSCM to respond to the crisis.

For the purpose of our research on firms with effective DDSCM, the firms in our sample must meet the following criteria: 1) The companies go into our sample on the month of their first appearance in AMR's "Supply Chain Top 25" list; 2) The companies must have return records on the CRSP monthly data; 3) The company must have complete data on Compustat provided by Standard and Poor's Research Insight. Our empirical results are based on a sample of 44 firms from 19 different industry sectors based on the 48 Fama-French industry classification, which is well accepted in finance studies [16]. The multi-industry context of our sample firms suggests that the results are more likely to be applicable and generalizable across organizations as well as industries [64]. Please see Appendix A1 for the top DDSCM firms and their industries based on the Fama-French 48 industry classification.

3.3. Method for Identifying Long-run Abnormal Returns

In the finance literature, calendar-time portfolio approach is widely used in identifying long-run abnormal returns. Fama [14] point out that calendar-time portfolio approach is more appropriate in research on long-run performance because it provides more reliable test statistics, especially at the presence of cross-sectional dependence. Thus, our study presents main results based on calendar-time portfolio approach and use buy-and-hold abnormal returns as additional test.

The calendar-time portfolio approach is conducted in two steps. The first step is to create portfolios. The portfolio of top DDSCM firms is formed as follows: Following the announcement of top supply chain firms by AMR, stocks newly appearing in the top list are formed into a portfolio. We consider holding periods of 12, 15, 18 months, meaning that a stock is held in the portfolio for these lengths of time and then dropped. The portfolio of matching firms is formed similarly. The second step is to estimate the long-run abnormal returns based on the time-series of monthly portfolio returns.

As mentioned above, we find matching firms and use the portfolio of matching firms as a benchmark. Matching sample firms to firms of similar industry, size and BE/ME ratio is well accepted in the finance literature [8] [38]. In this study, we create two groups of matching firms. The first group of matching firms is identified based on industry (Fama-French 48 Industry Classification) and firm size. The second group of matching firms is identified based on industry (Fama-French 48 Industry Classification), firm size, and book-to-market ratio (BM). To generate the industry-size-matched firms, we pair each sample firm with a control firm that has the same industry and is the closest in terms of market capitalization. To generate the industry-size-BM-matching firms, we pair each sample firm with a control firm that has the same industry and is the closest in terms of matching score calculated from market capitalization and the book-to-market (BE/ME) ratio [18]. Formula for calculating matching score is listed in equation (1) as follows:

$$MS = \left[\frac{X_1^T - X_1^M}{(X_1^T + X_1^M)/2} \right]^2 + \left[\frac{X_2^T - X_2^M}{(X_2^T + X_2^M)/2} \right]^2 \qquad (1)$$

Where
$X1$ represents firm size (market capitalization), obtained from CRSP monthly data;
$X2$ represents Book-to-market ratio (B/M), defined as the book value of common equity (data item 60) from Comustat, divided by the year-end market value of common equity;
T refers to the *Top Demand-driven supply chain Management* sample; and
M refers to the whole CRSP-Compustat sample.

3.4. Validity Test: Halo Effect Test

It has been noted that most supply chain ranking systems including AMR study either explicitly or implicitly use accounting ratios of firms (e.g., inventory ratio), which is based on accounting numbers (or book values) at time t. Our test on long-run stock performance is based on market value (specifically, stock price change) after time t (i.e., 12 months, 15 months, and 18 months after the announcement).

In addition, we conducted halo effect test to exclude the alternative explanation that AMR panel experts rank supply chain performance simply based on prior financial performance (i.e., halo effect) rather than their effective DDSCM. We follow Brown and Perry [4] and examine halo effect with a logistic regression model. In the logistic regression model, we set up a binary variable (1 for Top DDSCM firms and 0 for control firms) as the dependent variable and five financial performance measures as independent variables.[2] Corresponding to our two groups of control firms (Industry-Size matching, and Industry-Size-BM matching), we do halo tests twice. In the first test, we put Top DDSCM firms and Industry-Size matching together and run a logistic regression. From Panel A of Table 1 we see none of the finance performance variables has statistical significant effect. The *p*-value (0.46) for the model's chi-square of 4.63 is not statistically significant, either. Based on the test, we conclude that our TOP DDSCM sample does not appear to suffer from a halo effect emanating from prior financial performance results.

[2] The logistic regression model is as follows:

$Y = B_0 + B_1ROA + B_2RMBV + B_3SALES + B_4GROWTH + B_5RISK + e$

ROA = net income/total assets at year t;

RMBV = (market/book value $_{firm}$)/(market/book value $_{industry}$) at year t ;

Sales = logarithm of sales at year t;

$Growth_t$ = (%change in sales $_{t-1}$ + … + %change in sales$_{t-3}$)/3;

Risk = debt/equity at year t; where t is year in which a firm is recognized as Top DDSCM.

TABLE 1: Halo Effect Test

Panel A: Results of Halo Effect Test (Top DDSCM firms vs. Industry-Size matching firms)

Statistic	ROA	RMBV	Sales	Growth	Risk
Coefficient	-5.468	0.023	-0.024	3.888	-3.690
p-Value	0.25	0.77	0.90	0.18	0.14
Chi-Square *p*- Value	4.63 0.46				

Panel B: Results of Halo Effect Test (Top DDSCM firms vs. Industry-Size-BM matching firms)

Statistic	ROA	RMBV	Sales	Growth	Risk
Coefficient	-2.116	0.008	0.183	-0.739	-0.545
p-Value	0.39	0.91	0.27	0.72	0.79
Chi-Square *p*- Value	2.06 0.84				

In the second test, we put Top DDSCM firms and Industry-Size-BM matching firms together and run logistic regression. Like the first test, as shown in Panel B of Table 1, there is no evidence that AMR panel experts rank firms based on halo effect. Therefore, the conclusion is: the use of these financial metrics in the original selection of the top demand-driven supply chain management companies does not appear to have systematically biased our results.

Note that our matching firm methodology also minimizes any possibility that experts' perceptions of past stock performance have a substantial effect on the ultimate identification of AMR's top DDSCM firms. We select the matching firms based on book-to-market ratio right before the AMR announcement. If a top DDSCM firm had done abnormally well or poorly in past stock movements, then its book-to-market ratio should be very low or high. By selecting matching firms on the characteristic of the book-to-market ratio, we control for the effect (if any were to exist). Even if one were to assume that we have not completely controlled for such an effect, we do an analysis with the Carhart four-factor model, which accounts for any book-to-market effect and momentum effect. For example, if stock of a top DDSCM firm has performed very well in the past, then there could be some continuing momentum or reversal in later movement. In our results based on the Carhart four-factor model, we use book-to-market and momentum factors to control for such an effect. If later abnormal returns are driven by book-to-market or momentum effects, they should not be particularly important after controlling for the two factors.

4. RESULTS

In this section, we examine the long-run performance of top DDSCM firms. As discussed in section 3.3, we present our main results based on the calendar-time portfolio approach in this section.

4.1. Results from Sharpe Ratio

Table 2 presents Sharpe ratio results for the portfolios of top DDSCM firms, matching firms, and stock market based on CRSP market index. For the definition and formula of the Sharpe ratio, please see Appendix A2.

TABLE 2: Sharpe Ratios

	12-month	15-month	18-month
Top DDSCM	0.0935	0.1139	0.1254
Industry-Size-Matching	-0.0666	-0.0292	0.0048
Industry-Size-BM-Matching	-0.1251	-0.0765	-0.0363
CRSP Market Index	-0.1007	-0.0224	0.0044

From Table 2, we can see that for the 12-month portfolio, the top DDSCM firms have a positive Sharpe ratio, indicating that on average, investment in the top supply chain portfolio earns a positive risk premium of .0935 each month after adjusting for total risks. In contrast, the investments in the matching firm portfolio and CRSP market index have negative Sharpe ratios. The Sharpe ratios for the 15-month and 18-month portfolio show similar patterns, except that the values become positive for industry-size matching firms and market for the 18-month portfolio. Overall, based on the Sharpe ratio, it is clear that the portfolios of top DDSCM firms perform better than both groups of matching firms and market. Thus, our results from the Sharpe Ratio investigation support our hypothesis H1a.

4.2. Results from Treynor Ratio

Table 3 presents the Treynor ratios for the portfolios of top DDSCM firms, matching firms, and stock market based on CRSP market index. For the definition and formula of the Treynor ratio, please see Appendix A2.

TABLE 3: Treynor Ratios

	12-month	15-month	18-month
Top DDSCM	0.0060	0.0073	0.0078
Industry-Size-Matching	-0.0042	-0.0018	0.0003
Industry-Size-BM-Matching	-0.0079	-0.0047	-0.0022
CRSP Market Index	-0.0052	-0.0011	0.0002

Consistent with results for the Sharpe ratio, the portfolios of top DDSCM firms perform better than matching firms and the market for all three holding periods (12-month, 15-month, and 18-month). Take the 18-month portfolio as an example. The top supply chain portfolio has a Treynor ratio of .0078, indicating that, on average, investment in the top supply chain portfolio earns a positive risk premium of .0078 per month after adjusted for systematic risks. In contrast, the investments in industry-size-matching firms, industry-size-BM-matching firms, and the CRSP market index have much lower Treynor ratios, 0.0003, -0.0022 and 0.0002, respectively. Thus, results from the Treynor Ratio support our hypothesis H1b.

4.3. Abnormal Returns after Controlling for 3-Factors

Table 4 shows the abnormal returns after controlling for Fama-French 3-factors for the portfolios of top DDSCM firms and matching firms. The second row of Table 4 reports the abnormal returns for the portfolio of top DDSCM firms. The third row reports the abnormal returns for the portfolio of matching firms.

TABLE 4: Abnormal Returns after Controlling for Fama-French 3-Factors

	12-month	15-month	18-month
Top DDSCM	0.0164 (0.0194)	0.0121 (0.0592)	0.0107 (0.0675)
Industry-Size-Matching	0.0007 (0.9206)	-0.0008 (0.8907)	0.0006 (0.9163)
Industry-Size-BM-Matching	-0.0035 (0.5424)	-0.0040 (0.4459)	-0.0022 (0.6677)

We run the following Fama-French Three-factor regression:

$$R_p - R_f = \alpha + \beta_1 * (R_m - R_f) + \beta_2 * SMB + \beta_3 * HML + \varepsilon \quad (2)$$

where $R_p - R_f$ is the monthly excess return on a portfolio, $R_m - R_f$ is the CRPS value weighted market return minus the risk-free rate in month, and *SMB* and *HML* are monthly returns on zero-investment portfolios based on size and book-to market (see Fama and French 1993). The estimated intercept or "alpha" is interpreted as the monthly abnormal return in excess of what could have been achieved by passive investments in the three factors.

As indicated in Table 4, for the 12-month holding period, the top supply chain portfolio generates positive and significant monthly excess return (i.e., Alpha) of 1.64 percent (*p*-value=.0194), which is equivalent to about 21.55 percent as an annual return. For the15-month holding period, the monthly excess return is 1.21 percent (*p*-value=.0592) and the equivalent annualized return is about 15.39 percent. When the holding period extends to 18 months, the monthly excess return is 1.07 percent and equivalent to 13.62 annualized returns. This is important evidence that DDSCM do create value for shareholders after controlling for the Fama-French three factors. In contrast, the portfolios of both groups of matching firms produce no significant excess returns.

Our results so far show that, after controlling for three-factors, the portfolio of top DDSCM firms provides investors with more significant abnormal long-term returns than matching firms. Our hypothesis H1c is supported.

4.4. Abnormal Returns after Controlling for 4-Factor

As an extension of the Fama-French three-factor model, Carhart [7] proposed an additional factor—Momentum (*MOM*). Incorporating *MOM* shows whether the portfolios rely on momentum investing to earn abnormal returns. For the purpose of robustness checks and dealing

with the possibility that the abnormal returns in our study result from momentum trading, we run the four-factor regression as follows (See Carhart 1997 for more details):

$$R_p - R_f = \alpha + \beta_1 * (R_m - R_f) + \beta_2 * SMB + \beta_3 * HML + \beta_4 * MOM + \varepsilon \quad (3)$$

The results for abnormal returns after controlling for the Carhart four factors are presented in Table 5. We can see that the results here are very consistent with those results in Table 4. For example, for the 12-month holding period, after controlling for four factors, the top supply chain portfolio generates a positive and significant monthly excess return (i.e., Alpha) of 1.64 percent (*p*-value=.0210) and it is equivalent to an annual return about 21.55 percent. In sum, our results are robust even after controlling for the additional factor of momentum (*MOM*). That is, our hypothesis H1d is supported.

TABLE 5: Abnormal Returns after Controlling for Carhart 4-Factors

	12-month	15-month	18-month
Top DDSCM	0.0164 (0.0210)	0.0121 (0.0624)	0.0106 (0.0718)
Industry-Size-Matching	0.0004 (0.9450)	-0.0012 (0.8235)	0.0000 (0.9983)
Industry-Size-BM-Matching	-0.0036 (0.5354)	-0.0041 (0.4333)	-0.0024 (0.6359)

5. CONCLUSION

Our study examines the long-run stock price performance of firms recognized as having highly effective DDSCM. We find statistically significant difference in the long run performance of top DDSCM firms versus the matched control firms. Based on a sample of 44 top DDSCM firms announced by AMR Research during 2004-2008, and applying various ways to measure risk-adjusted long-run abnormal stock returns, we find that the portfolio of top DDSCM firms provide investors with statistically significant abnormal long-term returns. Specifically, the abnormal return of our sample firm portfolio after controlling for four-factors (market, size, book-to-market ratio, and momentum are controlled) is nearly 21.55 percent for annual return if holding sample firms for 12 months after the announcement date; 15.39 percent if holding for 15 months; 13.62 percent if holding period extends to 18 months.

5.1. Implications

Our results have several of key implications. Unlike previous studies focusing on a certain practice or aspect of DDSCM [6] [11] [29] [30] [55], we provide evidence for the effect of DDSCM on firms' market value based on an overall evaluation of DDSCM practices by an independent party (AMR). Hendricks and Singhal [23] point out that ranking systems play important roles in spreading out best managerial practices. We have similar comments on the value of AMR's top supply chain ranking system, which recognizes firms that have implemented effective DDSCM, promotes DDSCM awareness and practices, motivates and challenges firms

to improve DDSCM, and provides a bench-mark and goal against which a firm can evaluate the progress of its DDSCM. In addition, winning recognition as being a top DDSCM firm can be viewed as a credible and low-cost mechanism to signal to the market and customers that the firm has implemented an effective DDSCM program.
In contrast to the anecdotal and perceptual evidence used by many to pass judgment on DDSCM's value-creation potential, we provide a more factual and statistically valid assessment of the value. Effective implementation of DDSCM leads to significant improvement in long-term market value performance. Our results also indicate that DDSCM effectiveness stands the examination of changes over time. Especially, the evidence suggests that the market retains strong confidence in the competitiveness of firms with effective DDSCM in turbulent environment caused by global financial crisis in 2008. This confidence is revealed through the superior stock returns that effective DDSCM can create over an extended period (12, 15, 18 months).

Our results should be interesting and useful to those who are seeking new investment opportunities. Like such factors as brand reputation and risk management, DDSCM effectiveness can be an excellent indicator for stock purchase and holding decisions. Building on effective DDSCM, the best value supply chains are emerging as means to create competitive advantages and market performance [33] [36].

Our results underscore why firm strategies need to focus on effective DDSCM. Successful firms understand that the right supply chain strategy is to meet specific needs of the end customers [35]. The “Supply Chain Top 25” firms have consumer-driven supply chain systems, which build up dynamic capabilities across supply chains so that customized supply chains can be created for every customer need [36] [39]. However, as scholars have pointed out, unlike efficiency-improving or cost-reduction activities, where return on investment is easy to compute, it is much harder to make business decisions for investments that improve the reliability and responsiveness of supply chains [12] [25] [47]. The evidence presented in this paper can help with business decisions in this regard. Investments in supply chain practices enhancing DDSCM could be viewed as buying insurance against unexpected changes in business environment.

5.2. Further Application: Buy-and-Sell Abnormal Returns

To provide further evidence regarding the practical application of our findings, we conducted additional analysis, investigating whether or not investors can earn significantly positive abnormal returns by simultaneously buying a portfolio of top SCM firms and selling a portfolio of matching firms.

As presented in Table 6, we create a portfolio of simultaneously taking a long position for top DDSCM firms and a short position for matching firms. We still control Fama-French three factors and Carhart four factors for this analysis.

TABLE 6: Abnormal Returns from Buy and Sell Portfolios

Panel A:	12-month	15-month	18-month
Fama-French 3 factors: Buy Top DDSCM and Sell Industry-Size-Matching	0.0157 (0.0298)	0.0129 (0.0496)	0.0010 (0.1013)
Fama-French 3 factors: Buy Top DDSCM and Sell Industry-Size-BM-Matching	0.0200 (0.0029)	0.0161 (0.0095)	0.0128 (0.0261)
Panel B:	12-month	15-month	18-month
Carhart 4 factor: Buy Top DDSCM and Sell Industry-Size-Matching	0.0160 (0.0219)	0.0133 (0.0344)	0.0106 (0.0735)
Carhart 4 factor: Buy Top DDSCM and Sell Industry-Size-BM-Matching	0.0200 (0.0031)	0.0162 (0.0095)	0.0129 (0.0254)

The results indicate that investors can earn significantly positive abnormal returns by simultaneously buying a portfolio of top DDSCM firms and selling a portfolio of matching firms. Take the 12-month period portfolio of buying top DDSCM firms and selling industry-size-BM-matching firms as an example. As shown in Panel A, on average, after three factors are controlled, investors can make 2.00 percent (*p*-value=.0029) abnormal returns each month. Results from the 12-month period portfolio of buying top DDSCM firms and selling industry-size-matching firms are qualitatively similar and statistically significant. Panel B shows that we have consistent findings after we control for Carhart four factors.

APPENDIX

A1: List of Top DDSCM firms and the initial time listed by AMR (2004 to 2008)

Company Name	Year	Month	Industry based on 48 Fama-French Industry Classification
Anheuser-Busch	2004	11	4
Apple	2007	5	35
AstraZeneca	2007	5	13
Best Buy	2004	11	42
Boeing	2008	5	24
CVS/Caremark	2008	5	42
Canon	2004	11	9
Cardinal Health	2008	5	41
Caterpillar	2008	5	21
Cisco Systems	2005	11	36
Coca-Cola	2004	11	3
Dell	2004	11	35
Dow Chemical	2008	5	14
GlaxoSmithKline	2004	11	13
Hewlett-Packard	2004	11	35
Honda Motor	2008	5	23
IBM	2004	11	35
Illinois Tool Wor	2008	5	21
Intel	2004	11	36

Johnson & Johnson	2004	11	13
Johnson Controls	2004	11	38
Lockheed Martin	2007	5	26
Lowe's	2004	11	42
3M	2004	11	12
Motorola	2005	11	36
Nike	2005	11	10
Nokia	2004	11	36
Northrop Grumman	2008	5	36
Novartis	2008	5	13
POSCO	2004	11	19
Paccar	2007	5	23
PepsiCo	2004	11	3
Procter & Gamble	2004	11	9
Schlumberger	2008	5	30
Staples	2008	5	42
Sysco	2005	11	41
Target	2008	5	42
Tesco	2007	5	21
Texas Instruments	2005	11	36
The Home Depot	2004	11	42
Toyota Motor	2004	11	23
Wal-Mart Stores	2004	11	42
Walgreens	2008	5	42
Walt Disney	2008	5	7

A2: Formulas for Portfolio Performance Measures

1. Sharpe Ratio: $SRp = (Rp - Rf) / \sigma$

Where: SRp = Sharpe's Ratio for portfolio p,
Rp = average monthly return on portfolio p,
Rf =average monthly return on risk-free asset,
σ = standard deviation of returns of portfolio p

2. Treynor Ratio: $TRp = (Rp - Rf) / \beta p$

Where: TRp = Treynor Ratio for portfolio p,
Rp = average monthly return on portfolio p,
Rf =average monthly return on risk-free asset,
βp = beta for portfolio p

3. Fama-French Three-Factor Model:

$$R_p - R_f = \alpha + \beta_1 * (R_m - R_f) + \beta_2 * SMB + \beta_3 * HML + \varepsilon$$

Where: α = Abnormal return of a portfolio after controlling for the Fama-French factors
Rp = monthly return on portfolio p,

Rf = monthly return on risk-free asset,
Rm= monthly market return
SMB=Small minus big stocks
HML= High minus low stocks
ε = residual

4. Carhart Four-Factor Model:

$$R_p - R_f = \alpha + \beta_1 * (R_m - R_f) + \beta_2 * SMB + \beta_3 * HML + \beta_4 * MOM + \varepsilon$$

Where: α = Abnormal return of a portfolio after controlling for the Carhart factors

Rp = monthly return on portfolio p,
Rf = monthly return on risk-free asset,
Rm= monthly market return
SMB=Small minus big stocks
HML= High minus low stocks
MOM=Momentum factor
ε = residual

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WHAT A TIME-SERIES MODEL IMPLIES ABOUT TRADING STRATEGIES

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"We know that you can't trade profitably on the… so we know that it contains a unit root." This was overheard at a recent conference in reference to one of the many financial instruments that are often studied as part of investments and risk management research. Many who have worked in the time series space, particularly in the area of finance, have likely heard something similar. There is always a certain feedback between what we observe in markets and how data is tested. In this paper we seek to link the econometric testing of a financial data series with practical trading rules. We do not analyze strategically what portion of one's capital should be invested at each time step (for further analysis of this decision see Kelly [1956] and Rotando and Thorp [1992]). We also do not focus on the use of unit-root tests but instead focus on the implications of a particular data generating process, DGP (for a thorough analysis of this area we would refer you to Campbell and Perron [1991] along with Cochrane's comments [1991]). The purpose of this paper is to explain the error contained in the above statement and to add to the literature on time-series methodologies.

The remainder of the paper is organized as follows. Section I gives some selections from the relevant literature. In Section II, we discuss the trading rules implied by time series models. Section III reports the primary implications for researchers and practitioners. Section IV discusses several extensions, and Section V presents our conclusions.

LITERATURE REVIEW

We are seeking to merge two veins of research: time-series econometrics and trading strategies. A search of time-series on SSRN gives over 11,000 results; a search of trading yields over 19,000 results. Even with this wide variety of papers that use time series models for trading purposes ours is the first to our knowledge that presents a robust framework for whether or not a time series implies trading strategies. We begin with two of the most foundational papers for the underlying assumptions of financial research.

Harrison & Kreps (1979) build on the ideas of Black-Scholes-Merton by giving a theoretical framework for continuous-time, continuous state-space quantitative financial models. Harrison and Pliska (1981) develop a general stochastic model of a frictionless (no transaction cost, no restriction of selling short) market with continuous trading. These two papers laid the foundation for the vast majority of later derivatives pricing research. Our framework differs from theirs in that our focus is on the discrete-time, continuous-state space models that make up the majority of time-series econometrics. We now move to some selected papers that give indications of how time-series econometrics are being used to advance our knowledge of forecasting and developing efficient trading strategies.

There is a wide variety of financial applications for time-series econometrics. Kissell (2012) incorporates both previous prices and forward-looking implied volatilities to forecast intraday changes in volatility. Davies (2004) uses regime switching along with cointegration to model changing credit conditions. Zakamulin (2014) builds a covariance matrix in order to develop more appropriate GARCH models for portfolio formation. Li (2002) models volatility through an autoregressive fractionally integrated moving average model. He also notes that in financial markets the assumption of constant volatility is flawed and advocates for the use of GARCH-type models. Christoffersen, et al. (2013) survey the options pricing literature and a number of empirical papers to show the importance of modeling the volatility's time-series process in developing option prices. Xu and Wirjanto (2010) advance GARCH models by

proposing a mixing model that introduces fat-tailed distributions to the time-series space. Sum (2014) uses the time-series concept of Granger-Causality to show the causal relationship between stock returns and liquidity measures. Satish, et al., (2014) use forecasting models to estimate intraday volume. They note that adding this dimension of trade data improves model predictions. Moving beyond a direct market-order world model admits the possibility of any number of alternative order submission strategies.

A number of papers expand on dynamic order submission strategies. While our model focuses primarily on simple market orders, it is important to note that the real-world complexities of trading allow extensive strategic options. Harris (1997) notes that under a number of assumptions traders may optimally submit limit orders near the market in order to "pick up" a portion of the bid-ask spread. Peterson and Sirri (2002) give some empirical evidence for the use of marketable limit orders and show that the conditional costs of trading often drive order submission through different channels. Hollifield, et al. (2004) use data from the Stockholm Stock Exchange to show a number of empirical boundaries on the use of limit orders. Beber and Caglio (2005) use data from the NYSE to show that the impact of asymmetric information is largely depended on the depth of the order book and momentum. Buti and Rindi (2009) presents the idea that traders can strategically use electronic limit orders to create an order submission routine that is dependent on the execution of a previous order. They note a number of empirical correlations with book characteristics and note that these hidden orders are helpful in stabilizing orders during market stress. While these papers show a number of advanced applications of time series and strategic order submission, to our knowledge no paper has been written that shows exactly which time-series models imply a trading strategy.

MODELLING

Time-series modelling can be used for hypothesis testing and forecasting. In the first section we will focus on one-step-ahead forecasts and their usefulness in developing trading rules. Going forward we define "first" order trading rules as those that are based on one-step-ahead forecasts. This is in contrast to trading rules that are based on supplying liquidity or trading on movements in volatility. The second section looks at higher order trading rules that deal with trading on higher order moments of a process. We will begin by assuming that there are no costs to trading, and the stochastic reaction time problem is solved by assuming that our agent has enough time to place a trade at the current observed price in anticipation of the next observed price.

Each period our agent observes the current price (P_{t-1}) and previous prices and can approximate the stable price process. After observing the current price our agent enters a trade at the current price in anticipation of the next price. Prices move instantly to the next price in a way that our agent cannot place orders between time-steps or take advantage of the stochastic reaction time differences between traders. The market is competitive so that our agent's purchasing activity does not change the data generating process or move prices[1]. Each trade involves taking a position in the underlying (short or long) at one point in time then unwinding, maintaining, or expanding on it at another point in time. Although we begin with market-order oriented strategies, our conclusions can be readily expanded to alternative order strategies.

A. "First" Order Trading Rules

[1] In practice trading a particular strategy decreases its profitability over time. This loss is profitability is also common when increasing the scale of a strategy.

We begin with the simple mean-reverting[2] data generating process, DGP, for a financial instrument's price shown below:

$$P_t = c_0 + c_1 P_{t-1} + \tilde{e}_t \qquad (1)$$

Here P_t is the variable being modeled (the price denoted P can be thought of as stock for convenience) with t representing the point in time that an observation occurs. The regression variables c_0 and c_1 are such that there is not a unit-root, and e_t represents the error term. Here the trading rule is defined as follows:

Buy if $E[P_t] > P_{t-1}$
Hold if $E[P_t] = P_{t-1}$
Sell if $E[P_t] < P_{t-1}$

Here $E[\cdot]$ denotes the expected value. In the case of our simple mean-reverting model this can also be defined as follows:

Long if $P_{t-1} < E[P_t]$
Unwind if $P_{t-1} = E[P_t]$
Short if $P_{t-1} > E[P_t]$

Here *E[P]* denotes the long-run mean operation based on the regression of c_0 and c_1. These one-step-ahead trading rules are easily generalized for any ARMA DGP and non-linear DGPs. Any mean-reverting variable will give similar trading rules under the most general first set of rules which include the one-step-ahead forecasts. This same methodology can be extended to an I(1) variable (and correspondingly any ARIMA process).

Suppose that we begin our econometric analysis of the time-series P and further testing indicates the presence of a unit root. After repeating unit root tests we settle on an order of integration of 1 for our variable of interest. If in first differences there is some ARMA process then we will once again have an implied set of trading rules. Returning to our previous simple example we have the following:

$$\Delta P_t = b_0 + b_1 \Delta P_{t-1} + \tilde{e}_t \qquad (2)$$

Here we use the first differences in order to regress with I(0) variables. The first difference is as follows:

$$\Delta P_t = P_t - P_{t-1} \qquad (3)$$

This I(1) variable can be used to give the following trading rules:

Long if $E[\Delta P_t] > 0$
Unwind if $E[\Delta P_t] = 0$
Short if $E[\Delta P_t] < 0$

The trading rules could be further rearranged because ΔP_t contains the known variable P_t. The key insight here is that the presence of a unit root does not mean that a time series model does not imply a trading rule. Just as in the case that dealt with levels, instead of a mean-reverting AR(1) any ARMA model gives trading rules. Since these trading rules are not limited to levels, we can say that any ARIMA model gives

[2] Here we define mean-reversion not as regression to the mean, but in the time-series sense that data can be modelled in a reduced form by covariance-stationary process that has a finite long-run mean.

some trading rules and nonlinear models are certainly not precluded by our analysis. To further illustrate the generality of our model we present a "knife's-edge" case in which no trading rule is generated.

For pure white noise we would obtain the following DGP:

$$P_t = \tilde{e}_t \quad (4)$$

This configuration will allow the formation of trading rules because if there is a non-zero mean then regressions will indicate a trading rule that buys below the expected value of P_t and sells above the expected value of P_t. If there is only a unit root, with only white noise in first differences then we would arrive at the model below.

$$\Delta P_t = \tilde{e}_t \quad (5)$$

This DGP is closely related to what we know about the movement of equity securities, but it ignores a number of well-known patterns in equities (i.e. momentum, GARCH processes, yield curve exposure, Fama-French Factors, etc.). Here any non-I(0) variable that ends with a purely white-noise process, will admit only the hold step in our general trading rule because the expected value of the next term can only be zero. This is illustrated below. If $\Delta_i P_t = \tilde{e}_t$and $i \geq 1$ and lower order unit-root tests have rejected the presence of a unit root, then no implied trading rule exists. Here i is defined as the order of integration. Any other deterministic trends or exogenous variables will permit a trading rule to be developed under our assumption of no trading costs. Since we have addressed difference stationary series, we now examine the behavior of trend stationary series.

A trend stationary series is one that has some deterministic trend such that any long-run mean will be infinite in absolute value[3]. Suppose the following model:

$$P_t = b_0 + b_1 P_{t-1} + a_1 t + \tilde{e}_t \, (6)$$

The presence of the drift term, $a_1 t$, will cause this DGP to have an infinite long-run mean. Removing the trend will yield a stationary process that has the same trading rules as shown above.

Buy if $E[P_t] > P_{t-1}$
Hold if $E[P_t] = P_{t-1}$
Sell if $E[P_t] < P_{t-1}$

For a DGP with a positive drift the buy rule will occur more frequently because the process will be moving towards an increasing mean. We now move to nonlinear models.

The above arguments have focused almost exclusively on linear models. Moving beyond linear models, a DGP will imply trading rules as long as there is a region where the expected value of the next step is not zero (or undefined in the case of an exponential smooth threshold autoregressive model where there are two unequal roots and the internal region contains another unit root). Pereiro and González-Rozada (2015) propose just such a class of models in their use of a self-exciting threshold autoregressive, SETAR, to model the behavior of global equity markets. To illustrate this consider the following exponential smooth-transition autoregressive model:

$$P_t = \alpha_0 + \alpha_1 P_{t-1} + \theta[\beta_0 + \beta_1 P_{t-1}] \, (7)$$

[3] Although generally economic DGP will not move towards negative infinity we allow this possibility for completeness.

Where,

$$\theta = 1 - exp[-\gamma(P_{t-1} - c)^2] \qquad (8)$$

Here α and β are normal regression parameters. The function θ is a transition function between 0 and 1 so that the function for P_t smoothly goes from depending on just α_i to depending on both α_i and β_i. The function θ depends on γ a parameter for the speed of change and c a parameter for the center of the middle region. This parameterization describes a middle region and an outer region with different levels of mean reversion. To further illustrate the generalizations of our trading rules suppose that α_0 and β_0 are equal to zero, α_1 is equal to 1, and β_1 is equal to -0.9. Here this function describes a process that behaves like a unit root near zero but is highly mean reverting when far from zero. The previous trading rules easily generalize to nonlinear situation. When the most recent realization is far from its long-run mean, the trade is to buy or sell based on its mean reversion. When the most recent realization is near zero then the appropriate trade is to close out your exposure. Similar rules are possible for heteroscedasticity.

B. "Higher" Order Trading Rules

This section puts forward "higher" order trading—a category contains any trading strategy that uses order outside market orders or any derivative security written on the underlying. We begin with trading on the second-moment functions followed by additional derivative strategies.

There are a number of well-known econometric phenomenon that move beyond the first moment of data, and a large number of econometric models include a stochastic process for the variance as well as the levels of a variable of interest. In the options valuation space see Christoffersen, et al. (2013) for a comprehensive review. Let's begin with the simple GARCH model shown below:

$$P_t = a_0 + a_1 P_{t-1} + \varepsilon_t \qquad (9)$$

Where,

$$\varepsilon_t = v_t \sqrt{h_t} \qquad (10)$$

Where $\sigma_v^2 = 1$, and

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} \qquad (11)$$

Here P_t follows a basic AR(1) process with its error term taking the form of a GARCH(1,1) process. The variable v_t is a white noise process.

Since the DGP of the variance is mean-reverting, trading rules are readily available for trading on the variance. The presence of options will make this much easier. When the goal is to trade on the volatility the following rules can be used:

Straddle if E[h_t] > E[h_t]
Unwind if E[h_t] = E[h_t]
Reverse Straddle if E[h_t] < E[h_t]

The straddle used in the above trading rules is interchangeable with other volatility trading strategies that are commonly known and traded (iron butterfly, iron condor, strangle, etc.). The key insight here is that even a unit-root DGP admits trading strategies if it contains a volatility process or even a higher-moment

process than volatility. This approach generalizes even to the discretized forms of higher-order stochastic differential equation models like those of Chen (1996). Some recent ideas in trading and academic research show the use of options to invest in skewness and kurtosis. Regarding equities, it is well known that stock returns are negatively skewed and leptokurtic. These effects can have a significant impact on trading strategies particularly those in the higher-order category. Carr and Wu (2004) is one example of a model of stochastic skewness in currency options. These higher order moments can be traded as these models also typically incorporate some mean-reversion in the higher moments. In addition to the presence of higher-order moment effects it is important to note the possibility of alternative error-term distributions.

A growing body of literature and investment capital has been moving to models and funds that incorporate alternative distributions and functional forms (see Taleb, 2009; Taleb and Goldstein, 2011). As long as the conditional expectation of the next time step is defined these trading rules work. Some notable issues are "pathological" distributions like the Cauchy distribution, some forms of symmetrical power distributions (that have an undefined mean or standard deviation), and Lévy distributions. Although many of these have some application in finance and economics their properties exclude them from traditional time-series econometrics.

Any covariance stationary DGP that can be accurately modelled as a time-series process implies some profitable trading strategy except for those processes that have all the following: an order of integration greater than or equal to 1, a difference stationary process that is only white noise, and higher moment effects that follow the same pattern.

IMPLICATIONS

While our findings seem to open the doors for a large number of profitable trading ventures it is important to note that in practice this is not the case. The factors that generally cause time-series models to not be economically significant are as follows: trading costs, liquidity, and structural breaks.

There are a number of well-known pricing phenomenon that are not viable due to trading costs. One such example is the "January Effect." The January Effect is the phenomenon where stock prices seem to consistently rise during the beginning of January. Although this effect is commonly observed, the magnitude of the increase is too small to allow profitable trading once the execution costs are considered. This is not the only trading strategy that disappears when trading costs are considered. Many technical analysis strategies disappear when trading costs are added. Correspondingly, in thinly traded markets like those of exotics almost all trading strategies disappear when trading costs are measured (this can be seen in nearly any binary option chain; see Chaudhury, 2015 for additional evidence of the wide heterogeneity in these markets). Malkiel (2003) has argued that the January effect has totally disappeared from markets. In addition to this seasonality effect there are many others. For instance the lunar cycle effects (see Dichev and Janes, 2003; Herbst, 2007; and many others). There are many biological processes that are attributed to the lunar cycle. Dichev and Janes (2003), among others, put forward evidence that the lunar cycle's effects are seen in stock prices. If consistently observed this pattern fits within our model of DGP-implied trading rules. However, Herbst (2007) finds no consistent evidence for this pattern. His findings are consistent with the Efficient Market Hypothesis which deserves some mention.

The Efficient Market Hypothesis, EMH, states that it is impossible to consistently earn higher economic returns that those warranted by the risk that you are taking in a particular investment. In the academic space this idea is taken as irrefutable fact, but in the practitioner arena it is often ignored. Large portions of the stock market still use technical analysis to generate returns. There are even notable exceptions to

this idea like Warren Buffet's firm. If markets are even weak-form efficient then on the surface it would appear that none of our trading rules are appropriate (recall that the weak-form EMH states that all previous price and volume patterns are incorporated in to the current stock price). Even if we limit our DGP to processes that contain only the current price there is still an extraordinary variety of autoregressive, nonlinear, higher-order moment, and higher orders of integration processes that will generate these trading rules within an efficient market paradigm. Another common issue with the deployment of these strategies is a liquidity constraint.

Many mutual and hedge funds have found that they are more able to compete and attract new capital if they use leverage to multiply their returns. Often it is this additional leverage that causes these funds to fail (see Mitchell and Pulvino, 2012). In many of the DGPs considered in this paper there is some, albeit small, probability that the investment can go to zero. If the investment becomes worthless then even an unleveraged firm becomes worthless. Note that in our proposed trading rules we have included no mention of the amount of capital that should be placed in an investment. This decision should be based on some other metric like the Kelly Criterion or a previously agreed upon value-at-risk threshold. The primary effect of leverage in this sense is that it increases the threshold below which the investor has exhausted his capital (or if deliberately holding on to extra cash reduces exposure levels to a more acceptable level). One other profound error is in how the DGP is described.

There is a wide variety of financial models that are reliant on first taking the natural log of the time-series observations before fitting them with a parsimonious model. This common practice in time-series econometrics has a hidden side effect in that the fitted model implies that the process cannot go to zero. Computing a value-at-risk with these models in the absence of leverage would lead a trader to assume that the strategy has a zero chance of bankruptcy. Interestingly, the discretized stochastic process used in the Black-Scholes-Merton option pricing model has this zero chance of bankruptcy. Although there are some portions of the commodities and volatilities markets where this assumption is reasonable, the vast majority of equity and interest rate markets admit a chance of zero. For instance, in equities the clear event is bankruptcy. In the fixed income markets there are a number of models used for interest rate processes and very few of them allow a negative rate. As of the writing of this article several countries have negative rates and the Federal Reserve has even broached this possibility. The presence of negative rates shows one of the most important components of any trading strategy—change.

Once an appropriate time-series model has been found and a trading strategy deployed it becomes important to monitor the day-to-day trades in order to know when the underlying market behavior has changed. In 5,000 years of recorded history there is no record of negative interest rates until very recently. This is a profound change in financial markets. In deploying a trading strategy based on time-series econometrics a strategy needs to be developed to monitor when market behavior has changed (see Cooper and Van Vilet [2012] for additional information on how statistical process control can be applied even to high frequency data). It is well-known that economics as a social science admits the possibility of performativity and counter-performativity. If for no other reason this is cause for continual monitoring.

EXTENSIONS

There are several important areas for extension in this space. The application of time-series econometric tools to the realm of finance presents a rich territory for research and trading opportunities. One extension of this work is to further develop, in a mathematical sense, these rules in the same way that Harrison and Kreps (1979) and Harrison and Pliska (1981) codified the foundational assumptions of finance. Their assumptions are built on continuous-time, continuous state-space models. Our assumptions in contrast are built on the discrete time, continuous state-space models of time-series econometrics. Another extension

is to give further examples of these strategies under vector autoregressive models like those mentioned in Cochrane's 2008 address. Many of the factor models used in frameworks like the Arbitrage Pricing Theory are based on these multifactor models (see Chen, et al., 1986). In this paper we have looked at the trading strategies implied by a particular time-series model, but it would also be important to see how these implied strategies relate to our understanding of the underlying data. The strategies put forward in this paper are inductive, but a companion piece could be written on the deductive portion of the exploratory cycle.

CONCLUSIONS

We have put forward a novel approach for linking statistically derived time-series econometric models with practical trading strategies. We have also shown that nearly all time-series models imply trading strategies, but also note that execution costs can devour any the profits even if the underlying strategy is sound. In searching for the most appropriate DGP this methodology gives additional insight into the underlying behavior of a particular process. It is important to note that just because trading strategies are not readily available does not mean that the DGP does not imply profitable trading strategies.

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WHO CAN YOU TRUST? IDENTIFYING SIGNALS OF TRUST IN SUPPLY CHAIN RELATIONSHIPS

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ABSTRACT

Trust between organizations is a necessary component for supply chains to function effectively. The nature of trust allows a party within a relationship to put themselves in a vulnerable state where they expect positive outcomes or intentions and behaviors from the other party. Supply chain management can be a source of competitive advantage for organizations. Signaling involves the exchange of information, and trust is a signal that organizations can look for to determine if a supply chain management relationship is worthwhile, leading to a stronger competitive advantage. As supply chain management is a source of competitive advantage, managers need to be able to recognize signals of trust in a supply chain environment. Recognizing these signals of trust will help create stronger supply chain relationships and thus a stronger competitive advantage for the organizations that can trust each other as supply chain partners. Research was conducted to determine what the signals of trust are in supply chain relationships between organizations. This research was utilized to see which signals management should seek to know that they can trust a supplier in their supply chain. Knowledge sharing, relationship commitment, effective communication, planning and collaboration, and engage in well-reasoned risk were cited as signals of trust in supply chain relationships.
Keywords: Trust, Signal Theory, Supply Chain Management, Inter-organizational trust, Signals

WHO CAN YOU TRUST? IDENTIFYING SIGNALS OF TRUST IN SUPPLY CHAIN RELATIONSHIPS

In a world where global business interactions are both a necessity and a reality, organizations must seek ways to remain competitive. Strategic supply chain management is seen as a competitive advantage for global organizations [10]. Supply chains make up a large part of corporate budgets, and because of this, they are linked to performance [10]. A strong supply chain will yield better performance for an organization. Supply chain performance that suffers has the potential to decrease overall organization performance. Managers then should be cognizant of strategic supply chain management and the relationships that are developed because cultivating these relationships will lead to greater organizational performance.

Trust can be a predictor of positive performance within organizations [14] [10]. In reference to individuals, interpersonal trust can mean relying on someone and believing that they will act according to a common accord [7]. Just as trust between two individuals is important, trust between organizations is important as well. Organizations must rely on relationships with other organizations in order to operate effectively within their supply chain and trust is a major component of these relationships [15]. Further, trust can account for differences in performance in firms [29]. If organizations rely on strategic supply chain management to be successful, then trust, at the organizational level, must be examined for its importance to these relationships.

Signaling involves the relaying of information between two parties. Receiving accurate information between organizations is essential in order to make decisions and function appropriately [28]. Organizations often make decisions based on an asymmetry of information, and as such, signaling theory can be used as

an explanatory framework for how managers process and use information for effective decision making [4]. Organizations then should look for signals in order to receive and interpret knowledge, and then make decisions. Signals of trust relayed between supply chain relationships are vital so that organizations can determine whether to trust another organization or not, and thereby utilize trust as a competitive advantage. If a manager knows the signals to look for that indicate trust in a supply chain partner, they can then seek out those partners and develop strong strategic alliances.

Trust is a necessary and essential component of organization performance. Therefore, trust in supply chains should be considered due to its implications on competitive advantage. Signaling allows for information exchange and trust is a component of that information exchange that managers may seek. Managers in global supply chain networks may have a problem determining who to trust and therefore need to seek signals of trust to help make informed decisions. This paper will explore how organizations can identify signals of trust in supply chain relationships and strategic supply chain management in a global environment. This research will be performed through a collection of the relevant research, a literature review, and a rapid evidence assessment of the literature. The research question that will be answered is: What are the signals of trust in supply chain relationships?

TRUST

Rousseau et al. [22, p. 1998] states that trust is "a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another". Trust is known as a relationship between two parties and "a belief that other people will honor obligations in varying context in an open commitment to promote social welfare through a mere conformity with conventions" [15, p. 551]. The relationship consists of both a trustor and a trustee. The trustor is the party who puts themselves in a place of vulnerability and risk and the trustee is one who trust is placed in and could potentially take advantage of the trustor [15]. Further, the trustor must be willing to form the relationship with the trustee, and the relationship is "formed under *uncertainty* because the trustor can only guess the other' s trustworthiness" [22] [29, p. 1994]. "Inter-organizational trust is the collective trust orientation that managers and key organizational members hold towards a partner firm" [11, p. 5452] Similar to trust between individuals, managers in organizations put themselves in a vulnerable position based on their positive expectations of the supply chain partner firm. Trust is something that evolves over time, where organizations may trust each other more as time goes on, or may go in and out of trust for each other [5]. Further, trust is not all or nothing, where there is either complete trust or complete distrust. Parties can have various levels of trust for each other. There is a negative side to trust as well, as trust can be damaged through a lack of transparency and unethical behavior of an organization [3].

TRUST IN SUPPLY CHAIN RELATIONSHIPS

The dynamic and changing nature of the global business environment has increased competitiveness among firms. Strategic supply chain management is one way managers are remaining competitive in this ever changing environment. Supply chain management can be defined as "dyadic activities between existing alliance partners that have already established a relationship [5, p. 181]. Strategic supply chain management is a source of competitive advantage among firms in a global business environment [2] [13]. Strategic supply chain management "includes a variety of practices carried out within an organization to achieve and maximize effectiveness by managing the flow of finished goods, services, and information from point of origin to point of consumption through a set of directly linked organizations in the chain" [2, p. 312]. The increase in competitiveness globally has caused firms to seek way to determine how to create the most beneficial and productive supply chain relationships. Trust may allow for organizations to remain competitive in strategic supply chains [10]. Further, trust is a necessary relationship strategy and is a way

to create safety within supply chain relationships [11]. Trust is also an element of understanding the differences in performance among organizations [29].

THEORETICAL BACKGROUND

The lens from which trust in supply chain management will be examined is that of signal theory. This theory is relevant to how people process and interpret information appropriately. Signal theory can be used to help see how organizations receive signals of trust and therefore know which supply chain relationships they can create or focus on developing.

Signal Theory

Signal theory was first proposed by Spence [27] with his seminal work regarding job market signaling. Signal theory has been used to look at "information asymmetry between two parties, occurring as a result of knowledge disparity" [28, p. 1]. Signaling theory then involves getting rid of the differences, or asymmetry, in information by making sure each party is informed. The signaling process involves having both a sender and receiver of the information. Signaling theory is popular with managers as organizations seek to "use signals to reduce the uncertainty associated with making a selection among a choice set in situations that have incomplete and asymmetrically distributed information" [4, p. 1334]. Stakeholders look for signals, or observable actions, to determine unobservable attributes and likely outcomes and help stakeholders learn more about what they don't know [4].

Signaling can indicate true or false signals, and managers should recognize that there can be negative signals as well as positive signals from organizations [17]. False signaling can lead to opportunistic and deceptive behaviors and strategies [17]. Credibility of signals is higher when the punishment for producing a false signal is high, or the cost of producing a signal is high [27]. In other words, an organization is less likely to send false signals if they know that the consequences of it being discovered as false are severe.

CONCEPTUAL FRAMEWORK

The concept model presented below illustrates trust and its integration in strategic supply chain relationships. In this graphic the relationship between the trustee and the trustor are both portrayed. By nature, the trustee is in a position to take advantage of the trustor because they have knowledge that the trustor does not have. The trustor is portrayed as vulnerable and taking a risk because of the lack of balance of knowledge. With both organizations, they are seeking signals from each other to determine trustworthiness, and this is illustrated as a two way signaling between the two parties involved in a strategic supply chain relationship. The signaling shown here can be either positive or negative. In this concept model the organization (distributor) is seeking signals from their supply chain partner (supplier) to determine that they can trust the other organization so that they are more likely to take the risk and develop the supply chain relationship. Trust is developed and evolves over time and the resulting relationship will influence organizational performance.

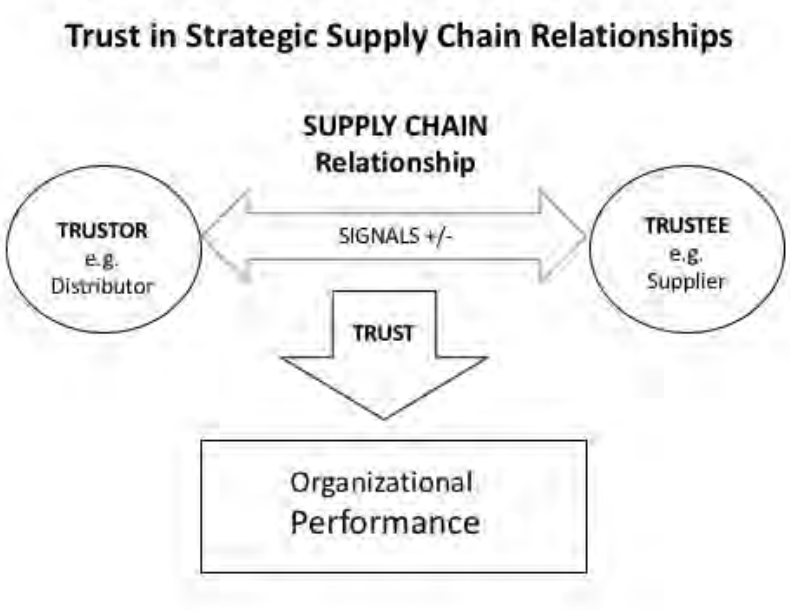

*Figure 1.*Trust and Supply Chain Management Relationships

METHOD

This research utilizes a rapid evidence assessment of the literature to analyze the literature on signal theory and trust in supply chain management. Rapid evidence assessments are utilized to perform an accelerated and precise version of the traditional systematic review [8]. The assessment was based on a research question which involved identifying the signals of trust in supply chain management. The research question was used to create a search string to find evidence about the research topic. Specific inclusion and exclusion criteria were applied to the search and articles were chosen to evaluate. A synthesis of the chosen articles was performed and a conceptual diagram created from the findings. Below is an explanation of the search string and inclusion/exclusion criteria leading to the final articles chosen.

The Search string that was utilized in UMUC (University of Maryland University College) Library's OneSearch database was "Trust" and "Supply Chain". The article search was refined to only include scholarly peer reviewed research articles. The titles and abstracts of the articles were reviewed to determine if they explored trust within supply chain management. The inclusion/exclusion criteria included: 1. Must be a primary research article; 2. Must be related to management. 3. Was published from 2006 to 2016. 4. Must be related to supply chain and trust. The ten-year time frame for the research was utilized to help narrow the scope of the search as well as to include the most recent and relevant research articles. All articles were scanned to determine their relevance to the research question and the final nineteen articles chosen were used for the synthesis. Below is the PRISMA diagram (Figure 2.) that illustrates the search string research methodology and inclusion/exclusion criteria.

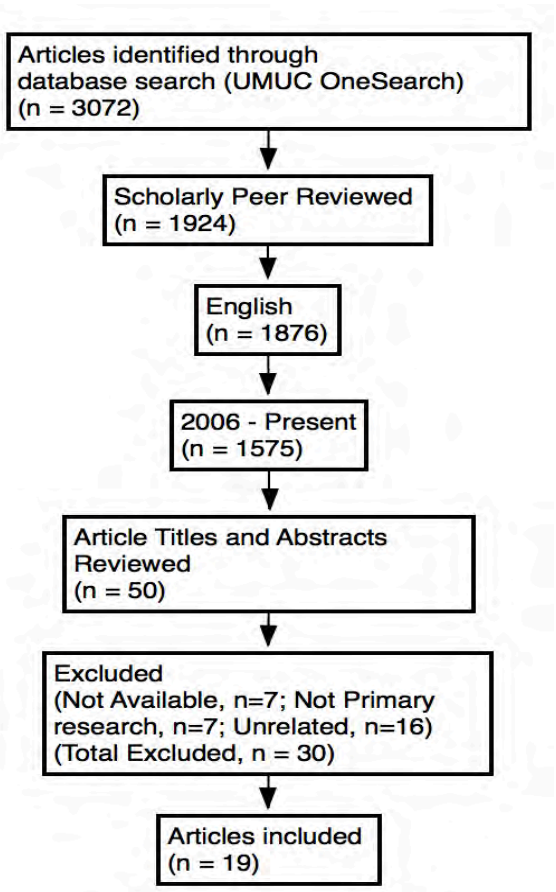

Figure 2. PRISMA diagram of Inclusion/exclusion criteria for research articles.

FINDINGS

A review of the research findings explored components of trust in relationship to supply chain management. These components were examined to determine the various signals that would indicate trust in a supply chain partner relationship. The signals identified through the review of the research articles formed various patterns pertaining to trust in supply chain relationships. The patterns that became evident through the review established a variety of trust signals such as, effective communication [18] [26] [27], engage in well-reasoned risk [11] [26], knowledge sharing [6] [12] [18] [20] [21] [23] [26] [27] [31]. non-mediated power [16], performance meets promise [12], planning collaboration [21] [24] [31] [20], relationship commitment [1] [5] [12] [19] [20] [27] [29], reputation in the market [27], and top management commitment [9]. Table 1 below outlines the research findings and the relevant trust signals that emerged from the literature.

Table 1

Summary of Research Findings

Source	**Trust Signals**
Abdullah, Z., & Musa, R. (2014)	Relationship Commitment
Brinkhoff, A., Özer, O., & Sargut, G. (2015)	Communication; Relationship Commitment

Cai, S., Goh, M., de Souza, R., & Li, G. (2013)	Knowledge Sharing
Hoejmose, S., Brammer, S., & Millington, A. (2012)	Top Management Commitment
Jones, S. L., Fawcett, S. E., Wallin, C., Fawcett, A. M., & Brewer, B. L. (2014)	Consistent Performance; Engage in Well-Reasoned Risk,
Jones, S. L., Fawcett, S. E., Fawcett, A. M., & Wallin, C. (2010)	Knowledge Sharing; Relationship Commitment, Performance meets Promise
Liu, H., Ke, W., Wei, K. K., & Hua, Z. (2015)	Non mediated Power
Michalski., M., Yurov, K. M., & Montes Botella, J. L. (2014)	Effective Communication; Knowledge Sharing
Muhammad, Z., Feng, Y., Naz, A. S., & Saleem, A. (2015)	Relationship Commitment
Paiva, E. L., Teixeira, R., Vieira, L. M., & Finger, A. B. (2014)	Relationship Commitment; Knowledge Sharing
Revilla, E., & Knoppen, D. (2015)	Planning Collaboration; Knowledge Sharing
Shamah, R. M., & Elsawaby, S. M. (2014)	Knowledge Sharing
Sharfman, M. P., Shaft, T. M., & Anex Jr., R. P. (2009)	Planning Collaboration
Singh, A., & Teng, J. C. (2016)	Relational Commitment
Skandrani, H., Triki, A., & Baratli, B. (2011)	Engage in Well-Reasoned Risk; Effective Communication; Knowledge Sharing
Suh-Yueh, C., & Wen-Chang, F. (2006)	Effective Communication; Relationship Commitment; Reputation in Market
Ueltschy, L. C., Ueltschy, M. L., & Fachinelli, A. C. (2007)	Relationship Commitment
Wang, Z., Ye, F., & Tan, K. H. (2014)	Knowledge Sharing
Zhang, M., & Huo, B. (2013)	Knowledge Sharing; Planning Collaboration

DISCUSSION

Trust is a vital resource for organizations that are seeking to utilize their supply chain as a source of competitive advantage [12] [11]. Supply chain relationships involve the various activities between alliance partners that are in a relationship together. In order to work together efficiently supply chain partners must feel like they can trust each other. A discussion of the signals of trust involved in existing supply chain relationships is presented below.

Signals, as related to signal theory, involve a sender and receiver who are trying to receive information and become more informed [28]. Signal theory involves an asymmetry of information between the parties involved [4]. One party has information while the other must look for signals, or "observable actions that provide information about unobservable attributes and likely outcomes" [4, p. 1335]. Whether an organization deserves trust in a supply chain relationship is unknown to an observer unless they are able to recognize signals, or observable actions, that show an organization is trustworthy. The following section will discuss the factors related to trust from a synthesis of the rapid evidence assessment of the literature of trust in supply chain management. The five most prominent themes surrounding trust that form a pattern from the review are presented below, followed by a brief review of some of the lesser noted trust signals.

Knowledge Sharing

Knowledge sharing is not only a key enhancer of supply chain performance, but also one of the strongest signals of trust [6] [30]. Knowledge and information sharing is significant to supply chain relationships, especially the amount and frequency of which it is shared [12]. The exchange of high quality information is beneficial for process integration, as well as for developing trust in supply chain relationships and managerial ties have a direct impact on the quality of information shared [18] [30]. Exchange of information can also foster long-term commitment and thus further develop trust [20]. Knowledge sharing and integration is not an easy task for an organization, but a trusting partnership must be built around knowledge sharing [21]. There is risk involved in knowledge sharing as two organizations become "locked" together, which makes trust all the more necessary in these relationships [31].

Relationship Commitment

Organizations that are trustworthy and share knowledge signal trust through relationship commitment [1] [5] [19]. "Trust not only leads to commitment in the relationship between dyadic partners, but also to stronger commitment of the employees and top management for supply chain projects—presumably as fear of opportunistic behavior and other uncertainties pertaining to the conduct of project partners lessens" [5, p. 194]. Trust and long-term commitment are essential for supply chain relationships in developing markets of the world [29]. Mangers of supply chains in developing markets need to build long term relationships and seek to have face to face interactions as well as phone calls [29]. In the supply chain relationship buyers do not always think about how their actions might affect suppliers. Although they realize they are dependent on suppliers, buyers that are independent and don't show empathy may have trouble building relationship commitment and trust [12].

Planning Collaboration

Joint collaboration and problem solving is noted by many suppliers to be a precursor to trust [12]. The way buyers and suppliers treat each other influences the amount of trust they have and therefore how likely they are to collaborate with one another [11]. Supply chain partners that are able to collaborate well with other organizations would signal that they are trustworthy. Further, supply chain planning is a sign of future commitment and therefore an indicator of trust [20]. Here again, there is a heavy and inherent risk involved as organizations come together as one to collaborate, plan, and problem solve [31]. When managers see that an organization can collaborate and play well with others they will tend to see that organization as trustworthy because other organizations are interacting with them in a positive manner.

Effective Communication

Effective communication among supply chain partners is a signal of trust [27]. Exchange of high quality information, collaboration, and dependence on supply chain partners all necessitate effective communication [18]. Good communication is not only a consequence, but also a builder of trust, and every effort should be made to foster it [5]. Communication between supply chain partners should be frequent, open, and ongoing [5]. Organizations that are known to communicate and be open are signaling trust to their partners.

Engage in Well-Reasoned Risk

Trust can be a relational advantage as well as a strategic choice [11]. "Instead of defaulting to risk-averse actions, managers must engage in well-reasoned investments that invite reciprocal action and foster collaboration" [11, p. 5463]. This means that a manger who is able to take a reasonable risk and profit from it will likely gain more trust from their partner. The partner will see that they are able to be successful with

an event of moderate risk as well as handle a challenge, and in turn will trust that partner more. One of the major risks perceived of trusting a partner is financial risk and those that are able to trust each other are also able to take on an amount of financial risk, trust becoming a manifestation of that risk [26]. In other words, organizations that trust their partners are able to trust them when it comes to a potential financially risky situation.

Other Signals of Trust

Some signals were discovered that, although they did not form an emerging pattern, may still be relevant as signals of trust and are worth mentioning in this discussion. Non-mediated power, such as referent, expert, and information power, positively influences good will trust in electronic supply chain relationships in China [16]. This makes sense, as knowledge sharing was one of the most noted signals in the literature, making information power a signal of trustworthiness. Reputation in the market was also found to be a signal of trust [27]. If an organization has a good reputation in the marketplace, then that might imply that they are in fact trustworthy. A lack of performance can impede trust, and when and organization promises to perform and they reach expectations they can develop trust [12]. Lastly, top management commitment may give "both credibility and benevolence in suppliers" [9].

Figure 3, below, offers a graphical representation of the signals of trust that are noted in the supply chain and trust literature. Trust occurs in a relationship between two entities, whether a person or an organization. One is considered the trustee, who has potential to take advantage, and the other is considered the trustor, who is vulnerable and is seeking signals of trust to determine if a supply chain partner is trustworthy, thus leading to greater organizational supply chain performance. In this case there is asymmetry of information and the trustor is seeking, through observable actions, to determine if the trustee is in fact trustworthy. The literature has shown that there are several factors that signal trust, knowledge sharing being one of the strongest signals. Relationship commitment, effective communication, planning collaboration, and engage in well season risk are also noted as signals that managers should be cognitive of when seeking to determine trustworthy supply chain partnerships.

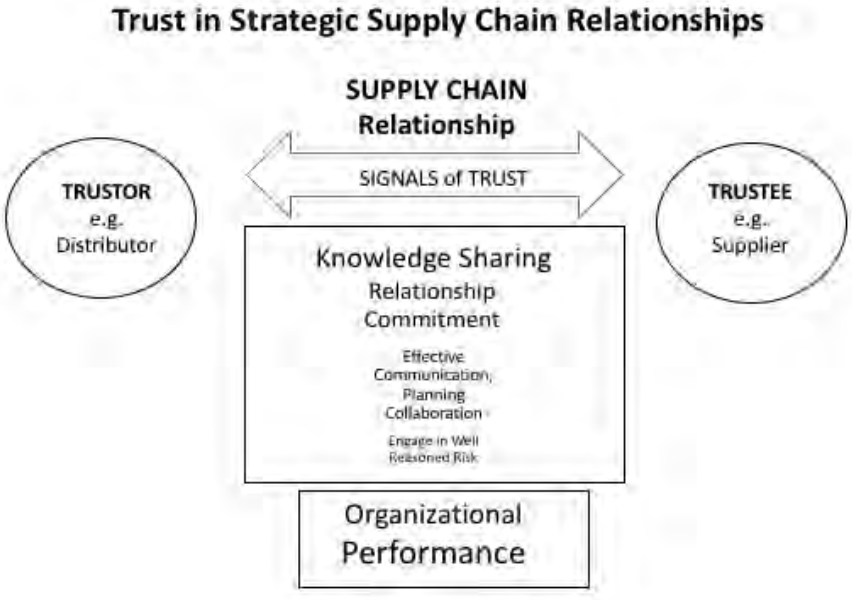

Figure 3. Signals of Trust in Supply Chain Management

IMPLICATIONS TO MANAGEMENT

The findings of this study show that trust is a crucial success factor in supply chain management relationships. Organizations competing in a global environment need to utilize their supply chain as a source of competitive advantage. In order to develop successful supply chain relationships, managers should seek to partner with organizations that they can trust. This research study shows that there are in fact signals that show whether a company will be trustworthy. Furthermore, a supply chain relationship with trust is more likely to be successful.

Managers should be strategic when developing their supply chain strategy, seeking supply chain partners, and developing trust with those partners. In order to take a strategic approach to seeking supply chain partners that are trustworthy, managers should seek organizations that are signaling trust. Managers do not know if in fact an organization is trustworthy, but through observations of trust signals they can attempt to determine which organizations to trust.

The first implication for managers presented in this rapid evidence assessment concerns knowledge sharing. Knowledge sharing, and information sharing, was prevalent across a large portion of the literature and the was most occurring theme [6] [12] [18] [20] [21] [23] [26] [30] [31]. Managers should seek out supply chain partners that are willing to share knowledge, which is a valuable resource. If partners are open and able to share knowledge this is a good indicator that they will be trustworthy. Although there is inherent risk to sharing knowledge [31] and it's not easy [21], it could be incredibly beneficial for creating trust.

The second implication is that managers should look for signals of relationship commitment. The second most prevalent theme examined was relationship commitment. Trust creates stronger partner relationship commitment and stronger relationship commitment among employees [5, p. 194]. Managers that are trying to determine if a partner will be trustworthy should seek to determine how long their previous relationships have lasted, as well as the commitment level of their employees. Organizations that foster trust will have higher levels of relationship commitment and long lasting relationships.

Finally, the third implication for managers is that they should consider a variety of trust signals when seeking out a supply chain partnership. While there are some signals, such as knowledge sharing and relationship commitment, that may be strong indicators of trust, other signals may accompany these stronger signals and be just as beneficial for managers. For example, an organization that shares knowledge is also likely to have effective communication and planning collaboration since each of these tend to go hand in hand [12]. It is difficult to share knowledge if you can't communicate effectively and if you are sharing knowledge you are likely planning and collaborating together.

LIMITATIONS

One notable limitation to this study is that the evidence assessed was not all specifically related to signals of trust in supply chains, rather some of the evidence was only related to trust in supply chains. Although the research was all relevant to trust in supply chain management, an assessment of only research pertaining to signals of trust may yield different results. Due to a limited number of studies on signals of trust in supply chain management, the research was broadened to trust in supply chain management. While the studies may not have directly pertained to trust signals, the evidence obtained from the literature used is still transferable to this discussion of trust in supply chain management relationships. Future research could examine the negative signals of trust in organizations, or signals of distrust.

CONCLUSION

Businesses competing in a global environment are seeking ways to gain a competitive advantage. An organization's supply chain can act as a source of competitive advantage and therefore managers should be concerned with developing the best strategic supply chain relationships. One indicator of a strong supply chain relationship is trust. Trust is important to organization performance and facilitates relationships. Managers may have a problem recognizing the signals of trust in their supply chain and therefore this research attempted to define what those signals are so that more informed decisions can be made about who will be a strategic supply chain partner.

Through identification of signals of trust in supply chain relationships, mangers can determine which supply chain partnerships will more likely be successful. Knowledge sharing and relationship commitment are strong indicators of trust in a supply chain relationship, however, managers should consider a variety of trust signals as many of them complement each other and are still relevant to decision making. Effective communication, planning collaboration, and engage in well-reasoned risk were also cited as strong signals of trust with supply chain partners. Though not as prominent a theme as knowledge sharing and relationship commitment, these signals still warrant attention and may be of use to managers seeking to negate the risk or vulnerability that comes with trust in a supply chain relationship.

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ABSTRACTS

A Case Study of a Pop-Up Supply Chain

Dr. Elizabeth Rasnick (Georgia Southern University)

In the aftermath of a disaster, food stores are already pushed to their breaking point. Often leaving many with rotten or no food. Local food banks normally operate at a break-even level of inventory. When the stress of a disaster is added, they are often overwhelmed. Initially, by the abrupt emptying of all their food stores and then by an immediate surge of food supplies and its accompanying need for distribution. This study investigates the details of this process following Hurricane Matthew in Bulloch County, Georgia. We look at how the food bank operates under normal conditions and then what plans are operationalized to managed the conditions following a disaster. \\Food drops are pop-up food banks that exist for a short period of time, usually less than two days. Food is dropped at a location, inventoried, sorted, and then distributed to those in need. This entire process is typically organized by volunteers, who no training in such operations. What are the factors that contribute to a successful delivery, and distribution of much needed food? That is what this study attempts to determine. By knowing what the key factors for a successful pop-up operation, community volunteers, in an emergency, can effectively dispense whatever the need supplies may be.\\To determine how an impromptu supply chain comes into existence, the organizers were interviewed and volunteers were surveyed. The results indicate that, at least on small scales, efficiency can be achieved in supply chains. This is even true when they are not tightly managed or overseen. This observation contradicts the current supply chain management philosophy of tight control.

A case study on the feasibility of assistive technology in helping people with disabilities in daily living

Dr. Melanie A. Greene (Pace University), Dr. James Lawler (Pace University), Dr. Jenna R. Hager (Pace University)

Advanced assistive technology is changing the daily habits of people with disabilities to be autonomous in the community. Artificial intelligence technology is empowering people with disabilities to be increasingly independent in society. The authors of this paper are evaluating Amazon Alexa Echo technology in helping people with cognitive and intellectual disabilities at a leading non-profit organization. The authors are learning that Alexa Echo device technology is a feasible improvement and intervention of high satisfaction in the life styles of eligible people with disabilities. The findings of this paper, as a preliminary study, can benefit practitioners and researchers considering current innovation in assistive technology for those with disabilities.

A Grants Administration Application Identifying the Best Path to Optimality

Mrs. Megan Wydick Martin (Virginia Tech), Dr. Cliff Ragsdale (Virginia Tech)

This research addresses a grant administration workload-to-staff assignment problem that occurs in the Office of Research and Sponsored Programs (ORSP) at land-grant universities in the pre-award process. We first identify the optimal (utopian) workload assignment plan using a mixed-integer linear programming problem. The optimal assignment of staff members to workload (academic departments) may differ considerably from the status quo, requiring multiple reassignments from the current state to reach optimality. The number of reassignments creates concerns related to loss of administrator-department relationship, loss of department-related knowledge, and increase in managerial inconvenience. In order to achieve the best workload reassignment with the fewest changes from the current status quo, while still placing a greater emphasis on the effective use of limited resources, we propose and illustrate a multiple objective optimization technique to identify the n best departmental reassignments from the current state that provide the greatest progress toward the utopian solution. Solving this problem over several values of n and plotting the results allows the decision maker to visualize the trade-off between the number of reassignments and the resulting progress achieved toward the utopian solution. This system supports the ORSP pre-award administrator in making an informed decision about the best number of reassignments (n) to choose based on an objective assessment of the relevant trade-offs.

A Stochastic Kernel Search Algorithm for Solving Hard Integer Linear Programming Problems

Dr. Jeremy North (Murray State University), Dr. Robert Nauss (University of Missouri-St. Louis)

Kernel search is a heuristic framework for solving integer linear programming problems. The procedure involves fixing a subset of binary variables to be either 0 or 1 and solving the resulting reduced problem using optimization. This process is repeated until a specified stopping criterion is met or (under the control of a branch and bound algorithm) optimality conditions are met. We consider hard integer linear programming problems in this work exclusively, with "hard"being defined as a problem that cannot be solved to optimality with proprietary optimal search codes like CPLEX or GUROBI within one hour of search time. \\\\ Historically, there have been two approaches to the Kernel search procedure. The first, referred to as "general kernel search'', works by identifying sets of binary variables to fix at 1 in the initialization phase and then proceeding to solve each resulting optimization problem. The amount of variable sets to fix and subsequent optimization problems to solve is controlled by a parameter set at runtime. "Iterative kernel search" is the second approach, which involves repeatedly updating the set of variables to fix and then solving the resulting reduced problem optimally in an iterative manner. The procedure ends when no new variables are identified to be fixed. \\\\ In this work, we operate within the iterative kernel search framework by implementing a stochastic search procedure to identify the set of binary variables to fix. This stochastic sub-routine is guided by a parameter establishing the cardinality of the set of variables to fix, and a probability of inclusion parameter for each variable. If the set of binary variables are given by (N), and the size of the set of variables to set is \textbar{}K\textbar{}, the resulting reduced problem will involve \textbar{}N\textbar{} - \textbar{}K\textbar{} otherwise unrestricted binary variables. These stochastic search parameters are updated at each iteration of the algorithm based upon objective performance, the optimality gap of the reduced problem after a parameter set limit of search time, and the reduced cost values (or pseudo costs) of each variable from the LP relaxation of the original problem. Computational results are given on benchmark data sets of the capacitated facility location problem and the generalized assignment problem.

Acting and Performing: The Influence of Manager Emotional Intelligence

Dr. L. Melita Prati (East Carolina University), Dr. Joy Karriker (East Carolina University)

We examined the predictive role of manager emotional intelligence (MEI) with regard to emotional labor efforts and outcomes relationships. Several hypotheses were tested to evaluate the influence of MEI on the effects of emotional labor activities employed by subordinates (e.g., surface and active deep acting). Relationships were examined between the emotional labor efforts employed by subordinates and their level of depressed mood, as well as the supervisory evaluations of the subordinates' emotional performance resulting indirectly and directly from the emotional labor activities. Specifically, we hypothesized that MEI will influence the performance of emotional labor and the effects of such activities on depressed mood and emotional performance. Also, findings indicate that MEI moderates the impact of depressed mood on emotional performance. Implications, limitations, and directions for future research are discussed.

Advertising and Gender: How Does One Affect the Other?

Ms. Amber Felton (Savannah State University)

Advertising usually seeks to appeal to a certain demographic. Often times that demographic is a particular gender. According to what society teaches, there is a certain way in which young boys and men are supposed to behave; and there is also a way in which young girls and women are supposed to behave. Based off these assumptions and the force that society places on individuals with regards to gender, advertisements targeting cultures, stereotypes, and gender are created. From a young age, children are targeted by commercials for toys, snacks, etc. Whether consciously or subconsciously, these commercials expose them to the gender roles that society embeds into their minds from an early age. This research focuses on determining how the advertising industry impacts the way in which gender is viewed in today's society. The following questions are being answered in this research: \begin{itemize} \itemsep1pt\parskip0pt\parsep0pt \item How does the advertising industry influence society's perception of gender roles. \item Does advertising serve as a mold for the roles that society has placed? \item Are advertisements biased towards gender? \end{itemize} \emph{Keywords: gender, biased, society, advertising, commercials}

Advertising on Social Networking Sites: Does Social Media Affect Consumer Decision Making?

Mr. Tyler Dawson (Savannah State University)

In today's society, the use of social networking is important to most individuals; especially to the younger generation. Social networking now is not only used for personal use, but now has become a key factor for businesses to integrate social networking into their marketing mix. Consumers use social networking as a method to connect with each other. Businesses are using social networking as a way to connect to their consumers, and change their purchasing behavior, but the effectiveness of the ads can be measured by the perceived usefulness (PU) if that particular consumer. Businesses use the sites like Facebook to facilitate their advertisements. This paper will answer the following questions: Does advertising on social media site change purchaser behavior? How is perceived usefulness used as a measurement tool? How are businesses integrating social media into their marketing mix? \emph{Keywords:}social networking, perceived usefulness (PU), Facebook, consumer behavior

Advertising under the Umbrella of Perception: Stereotypical Advertising

Mr. Daniel Gardner (Savannah State University)

\emph{This research study is designed to describe the foundation, the reasoning, and the psychology behind the usage of stereotyping within the advertising industry. Throughout this research paper, the various forms of stereotyping is dissected and analyzed with respect to seeking understanding of why this method is being used to target certain groups of people of different demographics. Individuals from different countries may have a significant number of similar products however, according to their cultural differences, the methods of advertising may differ depending on race/ethnicity, social status, gender, and even age. This research will also explore the different trends used to target a specific group of people in a particular market. This research paper answers the following questions:} \begin{itemize} \itemsep1pt\parskip0pt\parsep0pt \item \emph{What psychological appeals do advertising agencies use to pull a certain group of individuals into a market and turns them into buyers?} \item \emph{What does mean to promote what is not visible rather than what is visible?} \item \emph{Why is the same product advertised differently to individuals within the same vicinity of each other?} \item \emph{How does perception become that main driving force of an advertising campaign when a certain product is being advertised to a multicultural community?} \item \emph{What specific gender, age, racial, and social status techniques do advertising agencies use in their advertising methods?} \end{itemize} ~ ~Keywords: stereotyping, consumer perception, advertising appeals, individual appeals, psychology, demographic segmentation~

Age-Based Solution for Classification of Mutual Funds

Dr. Ali Nazemi (Roanoke College)

This study analyzes the population of available mutual funds to determine the best funds available for investors. In determining ideal fund choices, asset allocation categories are utilized to identify the mutual funds that best meet an investor's risk capacity, as determined by the investor's age.

Airline Quality Considerations and Indices: Improving the Approach to Customer Satisfaction Surveys

Mr. Ryan McNeil (Mount St. Mary's University)

Utilizing three major customer satisfaction indices, a selection of airlines, which all indices account for, will be reviewed, aggregated, and and compiled into a single meta-index. This will allow consumers to visit one index to make purchasing decisions, rather than visiting three or more indices to gather the same information. Current research, yet to come to a close, is being conducted to further explain tendencies of consumers when it comes to purchasing airline tickets. This further research will allow for a consumer satisfaction rating to be calculated in the Airline Quality Rating (AQR), which is currently published and supported by Wichita State University.

ALTERNATIVE THEORIES TO EXPLAIN BRITISH PETROLEUM'S RESPONSE FOR SUSTAINABILITY, ACCOUNTABILITY, AND REPORTING

Prof. Elizabeth D. Capener (San Jose State University), Dr. Maria Bullen (San Jose State University), Prof. Greg Kordecki (Clayton State University College of Business)

Formal environmental reporting is increasingly of interest to many groups of users of corporate information. The short run monetary considerations of catastrophic events appear to be fairly well developed and guided by financial standards and regulators, but the overall qualitative and quantitative long-run impacts are difficult to assess. Further, there can be a large variance in how reporting entities and other groups communicate information. While many companies may invest significant resources in environmental reporting, management response to crisis can appear overly defensive or directed away from issues at hand. British Petroleum's (BP) Gulf of Mexico oil spill demonstrates the case where management's response is far from congruent with its formal statement of environmental reporting. This paper explores alternative and sometimes competing theories of why information gaps develop. Specifically, does the management response attune itself in a posture of legitimacy, adapting activity to changing perceptions, or is the response guided by one or more stakeholder user groups? If dominant factors can be isolated, and if an appropriate vehicle for disclosure could be identified, would such information be useful to standard setters, regulators, and the general public?

An Examination of Etsy Shops as Online Micro-manufacturers

Dr. Richelle Oakley (Savannah State University), Dr. Mitchell Church (Coastal Carolina University)

Micro-enterprises are organizations that have 5 or fewer employees including the working owner and make up 92\% of 28 million U.S. companies in 2014 (a 5\% increase from 2013). Micro-manufacturers represent a subset of these micro-enterprises, defined as organizations that primarily focus on creating unique items for niche clientele. Micro-manufacturing examples include tailored clothing, handmade artisan goods, or made-to-order artwork digital artwork, among others. With limited resources and training, micro-manufacturers must identify their clientele and find markets for their products. Fortunately, the Internet has increased the reach of micro-manufacturers while also creating a thriving marketplace for customized products. As a result, prominent micro-manufacturing platforms like Etsy have seen significant growth in recent years. According to Etsy.com, as of 2015 they facilitated \$2.39 billion in merchandise sales by supporting 1.7 million active sellers and 26.1 million active buyers. The rise of Etsy represents a significant opportunity for micro-manufacturing, yet hurdles remain for these organizations. Limited resources, digital platform choice and investment, and avenues for sustained competitive advantage are just a few of the challenges that these organizations face. Adding to the problem, little research exists that can inform the competitive actions taken by micro-manufacturers looking to compete in digital platforms like Etsy.~ This study aims to fill this gap. Using cross-selling platform marketing as a theoretical base, we examine data from Etsy as a way to examine real-world actions in support of theoretical propositions. Specifically, we answer two fundamental questions: “What are the characteristics that describe successful micro-manufacturing organizations?‘, and “What micro-manufacturing actions are most associated with increased item~sales price in online environments?”. In answering these questions, we collected data on all the actions taken by 1386 Etsy shops and their customers over a period of three months. Empirical analysis of this data is used to develop a framework meant to demonstrate how micro-manufacturers utilize the scaling opportunities of online marketplaces in order to increase their customer base and support their selling activities. Results of this study show that micro-manufacturing sales success is highly dependent on engaging in the right types of activities in the right amounts.~ Takeaways from the study will be of use to both research and consumer settings. The study adds to data analytics research by highlighting the knowledge developed through insights gained from mining digital data over a period of time. Today’s consumers are becoming more comfortable with online commerce, which recently has begun to outpace traditional in-store shopping. Traditional retailers are being encouraged to innovate in their product offerings in order to differentiate themselves from competitors and gain a competitive advantage. Micro-manufacturers have much to learn (and teach) about how to carve out an online space in the increasingly crowded electronic marketplace.

An Exercise to Introduce Memorandum Components in a Quality Management Lecture

Prof. Julie Ann Williams (University of West Florida), Ms. Kristine Gallamore (University of West Florida)

This paper presents an exercise to introduce memorandum components in the quality management module of an undergraduate operations management course. Students are asked to role-play an operations manager by writing a memorandum to request information from a co-worker. Then students are asked to identify the following components in their memorandum: audience, problem statement, and follow-up action. Lastly, students are given an example of a memorandum with an appropriate recipient, statement of the problem, and request for specific information.

An Interdisciplinary Approach to Cybersecurity Curriculum

Dr. Donna Schaeffer (Marymount University), Dr. Cynthia Knott (Marymount University), Dr. Patrick Olson (National University)

Current media has many stories of cyberattacks on the global financial system. The system is inter-related and inter-dependent. Attacks on a single institution in one country can have major economic impacts throughout the world.\\In the United States, a voluntary risk-based Cybersecurity Framework was developed for all industries. The Framework is a set of industry standards and best practices to help organizations manage cybersecurity risks. The Framework was a collaborative effort between government and the private sector. The Framework avoids placing additional regulatory requirements on businesses.\\The Framework recognizes that organizations in various industries will continue to have unique risks – different threats, different vulnerabilities, different risk tolerances, and implementation of the best practices set forth in the Framework will vary. The Framework is a living document that is updated and improved as there is feedback on its implementation.\\We used the framework to design a curriculum and develop courses for a doctoral program in Cybersecurity. The courses are spread among the areas in the Cybersecurity Framework, and course competencies and learning objectives are derived from specifications in the Framework.\\This paper will describe how we plan to bring interdisciplinary aspects into the curriculum, while following the framework. In this paper, we focus on coursework in Accounting and Finance. We also prescribe a series of courses in research for cybersecurity, in which students could focus on Accounting and Finance issues if that is a career path they plan to take.

AN OVERVIEW OF JEFF SELINGO'S THERE IS LIFE AFTER COLLEGE AND IMPLICATIONS FOR BUSINESS FACULTY

Dr. Suzie Smith (Presbyterian College)

Former Chronicle of Higher Education editor Jeff Selingo has struck a nerve with parents, students, and higher education professionals in his book There is Life After College (2016). The book analyzes student academic and pre-professional attributes while in college and categorizes three types of post-college 20-somethings: Sprinters, Wanderers, and Stragglers. This presentation will offer a short summary of the book's main points and generate discussion about ways that Business Schools can inspire more Sprinter-like behaviors and reduce the population of Stragglers.\\\\The book draws from Selingo's own research in traveling with and interviewing many college students and young professionals. It also ties back to the existing body of knowledge and current state of research in higher education. Topics include behaviors that maximize future earnings, the best elective courses to take, three good reasons to take a gap year, why employers are redirecting their hiring focus toward interns, the effect of college debt on entrepreneurship, the effect urban locations have on professional success, entrepreneurial models other than college for 18-22 year olds, and where successful job leads are most likely to come from.\\\\All business faculty need to know the basics behind Selingo's ideas in order to advise students, address parent concerns, and design programming to coach students to become confident Sprinters rather than letting them wander aimlessly or straggle helplessly. This presentation will inform participants and generate ideas to improve success on each campus.

Analysis of Significant Success Factors in YouTube Channels

Ms. Delphia Schoenfeld (Fayetteville State University), Dr. Burcu Adivar (Fayetteville State University)

Social media, such as YouTube, has become a profession for thousands of average people, allowing them to earn as much as four million US dollars annually. In this study, we will be proposing a new problem called the channel assignment problem, used to determine how YouTube channels can maximize their profits. YouTube provides a platform for average people to create videos on various topics and connects with people from around the world. The social media site also matches advertisers with YouTube channels based on channel topics, video titles, and video "tags." Channels that receive high numbers of viewers and subscribers tend to be matched more with advertisers and receive higher advertisement revenue per advert played on those channels. Sometimes contacted directly for sponsorships from online companies looking to advertise on successful channels. In this study, we will use statistical analysis as our methodology to determine various parameters of the channel assignment problem, such as country of origin, the theme for videos on channels, and anonymity, that cause channels to obtain high numbers of viewers and subscribers, which generate high levels of revenue.

Analyzing Inventory and Primary Resources in the Supply Chain

Dr. Richard Monroe (Longwood University)

Inventory is recognized as an essential asset and a key driver in supply chain management. Inventory accounts for more than 50 percent of the current assets in many companies.~ Several other resources also occupy significant roles in the supply chain.~ Coordination of inventory and other resources is a central activity for supply chain managers.~ As a result, a growing area for supply chain careers is the job title of supply chain analyst.~ The purpose of this paper is to discuss the need for further coverage of supply chain analytics within existing supply chain programs.~ With a limited number of courses, it is critical to allot sufficient time to include appropriate analytics topics.~ Some initial examples in one supply chain program will be presented.

Antecedents of Job Satisfaction and Work Engagment: Mediating the Role of Cognitive And Affective Response

Mrs. Kimberly Crawford (Savannah State University), Ms. Leigh Davis (Savannah State University), Ms. Kristen Dixon (Savannah State University), Dr. Suman Niranjan (Savannah State University)

\textbf{Abstract} Every day, it is a normal process for individuals to go to their place of employment. Most individuals who work full time, works an average of 40 hours per week within a 5 day period, which breaks down to working 8 hours per day. That calculates to working over 2,000 hours per year. Due to this, working individuals are taking minimal vacations and time away from work, (Johnson, 2014) and end up working longer than they actually plan. Different studies have shown that more American employees are spending more time at their jobs than ever before. Since employed individuals spend such a significant level of time in the workplace, they should enjoy their jobs and have a sense of fulfillment; a sense of work engagement and job satisfaction. This study utilizes structural equation modeling with a sample size of 180 respondents using a questionnaire. Seven scales was used including, compensation, respectful treatment, job security, affective response, cognitive response, job satisfaction and work engagement. Structural equation modeling is used to evaluate the hypothesis. Findings indicate that antecedents~of job satisfaction and work engagement have a positive relationship with affective response.~

Are Cities in Vietnam Distributed According to Zipf?

Dr. Barry Pfitzner (Randolph-Macon College), Ms. Trang Tran (Randolph-Macon College)

In this paper we test for congruence with Zipf's Law among cities, towns, and communes in Vietnam. Zipf's Law prescribes a particular distribution of cities when ordered by population. Much of the extant literature testing for Zipf's Law utilizes a methodology that has been shown to produce biased estimates in small samples. Here we employ the techniques recommended by Gabaix and Ibragimov (2007, 2011), and focus on 2009 census data of 156 urban areas in Vietnam. We find support for a distribution consistent with Zipf's Law based on the full dataset, and two subsets: cities only, and cities and towns.

Are you using all of the Power of PowerPoint?

Prof. Wilma Andrews (Virginia Commonwealth University), Dr. Robert Andrews (Virginia Commonwealth University)

This session will give an overview of newer capabilities that provide more power to PowerPoint. Microsoft has brought out new capabilities in the 365 version of PowerPoint.~ Morph and Designer are two of these Microsoft enhancements that use Office 365 to make PowerPoint more powerful. ~Designer helps non-designers create visual slides that look very professional.~ Morph adds power to PowerPoint by providing animations and transitions that were not previously available in PowerPoint. Zoom adds a Prezi effect to slides. Office Mix is another relatively new feature. ~This free download is useful to educators in that it enables the creation of interactive online lessons. ~And 3-D animation thru Windows 10 Paint is projected to be an option soon. All the new features help users create more up to date presentations with increased interactivity. And can be a game changer in how PowerPoint is used in presentations.

Assessing Outsourcing Strategy on quality and performance of US Long-term Healthcare

Dr. Christie Chen (University of Tennessee at Martin), Mr. Monty Taylor (University of Tennessee at Martin)

Outsourcing is a strategy of focusing on core capabilities within an organization while creating a network of external experts in support skills. The US healthcare industry utilizes outsourcing to cope with reimbursement reductions from the 1997 Balanced Budget Act and managed care regulations. Specifically, US healthcare executives face the challenge of reducing costs while maintaining quality patient care in an environment of continuous change and turbulence. As such, outsourcing has become one of the strategic tools healthcare organizations use to control costs without affecting patient care. This study uses transaction cost economic theory to argue that contractual relationships among and within firms arise from efficiency-seeking actions; likewise, organizations incur costs as a result of planning, implementing, and enforcing exchanges with other organizations. With respect to external supplier exchange relationships, transaction costs can include costs associated with contract negotiations, monitoring adherence to contractual terms, providing financial incentives or penalties, and losses resulting from supplier noncompliance. This research maintains that a well-developed outsourcing strategy can reduce operational costs and improve the quality of long-term care facilities. The results also show that healthcare facilities can increase financial performance by building trust and relationships with outsourcing vendors.

Assessing Your Company's Ethics Profile

Dr. James Alford (The Citadel)

The current business climate and the many breaches of ethics by corporate officials demand that organizations actively pursue methods of assessing the ethical climate in the organization and follow the assessment with active management of ethics in the workplace. This workshop provides an opportunity for participants to review the role of ethics in the organization's operations and assess the effectiveness of its ethics programs. \\Assessment is accomplished through the administration of a field-tested assessment instrument and a comprehensive review of the findings of the assessment through an interactive workshop. Our research indicates that the approach used by this instrument is effective because it invites the participants to express their personal views of the importance of key areas of ethics practice and contrast that contrast that with their view of the organization's actual ethics practices. The workshop methodology should enable the participants to utilize the instrument in their own organizations.

Business Intelligence, Analytics and ERP Training

Dr. belinda shipps (North Carolina A & T State University)

Business Intelligence (BI) and analytics continues to be one of the fastest growing areas for businesses (DeAngelis, 2015). One of the top ten skills that employers want their new college graduates to have is the ability to analyze quantitative data (Adams, 2014). BI and analytics were predicted to be the number one investment for CIOs in 2015 (Richardson, 2015). Organizations are actively recruiting students with analytical and business intelligence skills but having difficulty finding candidates with Enterprise Resource Planning (ERP)/analytical and BI skills\ldots{} For these reasons, many Universities are adopting ERP systems that have BI and analytic components into their curriculums. However, ERP systems can be challenging to set up, operate and teach. This in-progress research investigates methods of teaching ERP systems using hands-on and collaborative approaches. Qualitative and quantitative methods will be used to evaluate the methods discussed in this paper.~ The results will be used to propose possible best practices.

CAN EXTENSIVE USE OF TECHNOLOGY BE AN EFFECTIVE MEASURE OF CRITICAL THINKING SKILLS?

Dr. William S. Thomas (University of North Carolina Pembroke), Dr. John Spillan (University of North Carolina Pembroke), Ms. Christine Bell (University of North Carolina Pembroke)

Since 2006, the unemployment rate in the United States has ranged from the mid 4\% range to the upper 9\% range. As rates ease downward jobs are created and filled. Organizations filling positions have several desires in common when it comes to hiring their employees. Strong critical thinking skills are one of the top attributes desired, but one of the hardest to determine, most costly to assess, and one that takes a great deal of time to measure if assessed accurately. Universities and other educational organizations suffer the same symptoms measuring critical thinking skills in students as they progress through degrees and programs (ie have students gained necessary critical thinking skills to prepare them for the future?).\\Large players participating in the space of critical thinking assessment are ETS (HEIghten Exam for Critical Thinking) and the Collegiate Learning Assessment (CLA). These assessments require a significant amount of time to measure critical thinking (assessment time and lead time to receive final grades), can be costly, and because they are language based, can be subject to bias in testing. Technology is used by both ETS and the CLA on the “frontend’‘to assess critical thinking and provides a conduit for test-takers to take and submit the ETS and CLA exams.\\The purpose of this writing is to examine the validity of utilizing more extensive use of technology in assessing critical thinking. Specifically, we will explore, examine, and validate a new critical thinking product that goes beyond the “frontend’‘of critical thinking assessment, delivering “backend” scoring, calculation, and determination of results as well as communication immediately upon completion, to both the test-taker and organization.

Causal variables in Oman's GDP Growth Rate 1995-2014

Mr. Michael Gannon (University of North Carolina at Pembroke)

Michael Gannon University of North Carolina at Pembroke ~ mrg011@bravemail.uncp.edu Working under: Dr. Bishwa Koirala,~Director of Economic and Business Research koiralabs@uncp.edu Dr. Lydia Gan, Economics and Decision Sciences Department Chair lydia.gan@uncp.edu\\ The growth and future prospects of GCC countries represent the application of developmental strategies to resource based economies. This paper is a panel analysis of variables that may be causal to the GDP growth rate, to include: military spending, education investment, healthcare investment, tourism, Oil rent, reserves, and export revenue, among ten others. The survey of the empirical analyses focuses on Oman within the context of similar economies in the GCC, and unique geopolitical and demographic conditions shared by those countries are thereby controlled. The panel analysis uses World Bank data run on a several regression models in STATA. Conclusions are that sustained growth is best achieved via investment in transitioning economies through education, healthcare, development of a middle class, limiting corruption, and opening the economy to entrepreneurship and FDI that is not centralized on resource extraction. Government investment in education has been statistically relevant to positive GDP growth rates, as have other variables. Also of note has been the role of Natural gas developments and the differences between those and oil reserves in the future. During the past fifteen years Oman and its sister GCC countries have all been investing in more extraction infrastructure as well as some of the highest military spending (as a percentage of GDP) in the world. These countries also have a large foreign-worker population that is a currently a problem for economic growth, and impedes development of a middle class and transition to a modern economy in the future. In Oman oil reserves are listed to deplete in sixteen years, though that timeline will be extended to some small degree as advanced extraction technology is used and oil prices rise to make employment of that technology profitable. Given that Oman has the smallest reserves in the GCC, and it is not a member of OPEC and therefore will produce above the quotas set (this is especially relevant in light of OPEC's November 30 announcement), it will most likely be studied as the first middle east economy to transform from petroleum based to either stability or failure. Lastly, the~leader since 1970, Sultan Qaboos, is in poor health, and the transition of power will complicate the tenuous peace and prosperity of the country, which is greatly held together by generous civil programs funded by oil revenue. These conditions position the understanding of Oman's GDP growth as an invaluable case study for the the GCC countries, developing economies, and the global economy as world oil reserves decrease. This analysis has attempted to measure the significance of the above effects with mixed results. The results and conclusions will be informed by supplementary meetings \\with highly ranked Omani economic ministers during a school-financed \\trip to Oman in December. The author has made arrangements to discuss during these meetings the opportunity for comparing current results with government data. ~

Credit Perceptions and Participation in Mainstream Banking

Dr. Rebecca Gonzalez (University of North Carolina at Pembroke)

This study analyzes credit perceptions in the United States and how these might impact participation in mainstream banking efforts. We use data from the 2015 FDIC National Survey of Unbanked and Underbanked Households to help us determine how individuals finance themselves and what factors impact these processes. The initial data evaluation provides greater insight into why individuals might be hesitant to seek out loans and how their perceptions of their personal credit situations might impact their willingness to seek out mainstream financing. Our findings indicate that individuals that are relatively unbanked or underbanked rely heavily on the use fringe financial services (payday loans, rent-to-own, etc.). This is largely due to convenience, cost, credit issues, personal feelings about banking systems, and a general lack of knowledge of how banking systems work.

CURRENT STATE OF RUSSIAN BUSINESS EDUCATION

Dr. Alexander Mechitov (University of Montevallo), Dr. Helen Moshkovich (University of Montevallo)

In this study we review some important changes in Russian business education in the last two decades. First, we discuss the organization of the Russian academia in general and its influence on the country's business education system, and then how these peculiarities have affected the structure and the content of Russian business programs. Russian business education in the past traditionally overemphasized technological and logistical issues at the expense of managerial and financial matters, and some areas like marketing or human resources were presented at rudimentary levels. That heritage explains many current problems and trends in Russian business education today.\\\\The recent development of new Russian business education has passed through three major periods since the beginning of market reforms in 1990s.: the initial skyrocketing rise in demand, popularity, and quantitative growth during the first decade of transformation; the first correction and restructuring phase since economic crisis in 1998; and substantially more matured state in the last 6-8 years, coincided with another economic downturn in 2008. The authors discuss the dynamics, specifics, and structural changes in Russian business education in all these three phases of the development. \\\\The study overviews the existing problems of business education in Russia, including meeting new higher academic standards, adopting new pedagogical practices, adapting to new demographic realities and declining enrollments in Russian business colleges, developing new business continuing education and master programs, overcoming geographical imbalance, and expanding cooperation with foreign peer institutions.\\\\Finally, authors discuss a new role of Russian business education in the current economic and political development of Russia. Russian transition to market economy is not a finished process. These days Russia lags behind many other emerging markets because of high monopolization of its economy, excessive state regulation, rampant corruption, outdated business legislature, and vague property rights. Business academic community can and should start playing more active role in handling these problems and becoming real agent of change in Russian society.

Curriculum Revision to Address a Changing Health Care Environment

Dr. Peggy Johnson (Lander University Greenwood South Carolina)

Health care reform, the Affordable Care Act, and changes in the U.S. health care system have necessitated modifying the scope and content of existing courses in the health care management curricula at Lander University. Lander is a university in upstate South Carolina with an enrollment of about 2500 students. The HCMT enrollment in the Lander school of management represents approximately 25\% of the total enrollment for the School of Management. Recently, deficiencies in the quality of patient care, as well as patient safety issues, have led to calls for change in health professions education by healthcare organizations and the Institute of Medicine (IOM) (Berwick, 2002). The foundation for any proposed curricular revision or changes in teaching practices must be firmly grounded in a comprehensive review of the literature and input~ \emph{from students, alumni, and the professional health care community. The recent literature in the field and input form stakeholders will assist faculty with the curriculum evaluation and revision~}\emph{\emph{process. The process for curriculum change in the Lander University health care emphasis is described in this article.~}} \emph{\emph{\\}}

Developing a Curriculum: The Development of a Doctoral Program in Cybersecurity

Dr. Cynthia Knott (Marymount University), Dr. Donna Schaeffer (Marymount University), Dr. Patrick Olson (National University)

Almost daily, current media offers a different story about data breaches, hacking, privacy, and security. In today's digital society, security of our personal information is a major concern for individuals, security of corporate data is a bottom line issue for organizations, and security of the physical and economic infrastructure is a national concern.\\The interconnectedness of our systems results in bigger and more complex risks. For the nation, the economy, public safety and health are at risk. For companies, security risks drive costs up and impact revenues. Companies may lose their ability gain and maintain customers. \\In February 2013, President Obama issued Executive Order 13636, "Improving Critical Infrastructure Cybersecurity.'' This executive order established that "{[}i{]}t is the Policy of the United States to enhance the security and resilience of the Nation's critical infrastructure and to maintain a cyber environment that encourages efficiency, innovation, and economic prosperity while promoting safety, security, business confidentiality, privacy, and civil liberties." \\To enact the policy, a voluntary risk-based Cybersecurity Framework was developed. The Framework is a set of industry standards and best practices to help organizations manage cybersecurity risks. The Framework was a collaborative effort between government and the private sector. The Framework avoids placing additional regulatory requirements on businesses. \\The Framework recognizes that organizations will continue to have unique risks – different threats, different vulnerabilities, different risk tolerances, and implementation of the best practices set forth in the Framework will vary. The Framework is a living document that is updated and improved as there is feedback on its implementation. \\We used the framework to design a curriculum and develop courses for a doctoral program in Cybersecurity. The program has 25 courses worth 75 credits, of which ten courses or 30 credits can be transferred in from a Master's level program in Cybersecurity. The courses are spread among the areas in the Cybersecurity Framework, and course competencies and learning objectives are derived from specifications in the Framework.\\This paper will describe the seven areas and discuss the coursework that will provide graduates with the necessary competencies to be cybersecurity experts. We also prescribe a series of courses in research for cybersecurity.

Digital Media Adoption: A Case for Digital Assistance Program for Micro Agribusiness Enterprises.

Dr. Renu Singh (South Carolina State University)

The rapid growth of the World Wide Web and the digitalization of customer facing channels have forced many businesses to adapt for survival in the digital competitive landscape. Today, businesses must maintain a strong presence in the online digital world through utilization of technologies such as traditional e-commerce, social media, and mobile computing to capture and maintain customer attention, provide services and products, and accrue financial value. Adding to the challenge faced by businesses is the rapid rate of change of online digital technologies. While many small and medium sized businesses adapt and evolve in their use of online digital technologies through interventions provided by consulting, practitioner, and academic literature, little is known about the challenges and constraints faced by micro-businesses, i.e. businesses that employ nine people or less. To address this shortcoming in academic research our study focuses on four constraints (system-fit, human capital, infrastructural, and financial) faced by micro-businesses.Our work draws upon the results of an ongoing research project which is investigating the adoption of digital technologies by entrepreneurial businesses in Southeastern United States. Based on data collected from 1200 micro businesses, we contend that these constraints significantly diminish the ability of micro-businesses to maintain active and passive online presence through the use of online digital technologies. Diminished online presence, in turn, adversely affects the ability of micro-businesses to accrue financial value while also constraining their ability to grow reputational capital. We conclude that State and/or Federal assistance programs can go a long way to help these businesses adopt new technologies and increase digital capacity.

Distance as a Determinant of Trade Costs: A Different Type of Distance Puzzle?

Dr. David Buehler (Pennsylvania State University - Harrisburg), Dr. Roger White (Whittier College)

Employing a gravity model approach and using recently released estimations of trade costs between nations, we present confounding results that demonstrate a new "trade-cost-distance puzzle." Using data from 1995-2012, we examine the influence of various determinants of trade costs, including the distance between trade partners. While the estimated coefficient on the distance variable is positive as expected, we show that the distance between countries has an increasing influence on trade costs over time, which runs counter to intuition regarding the effects of globalization. These results hold whether the estimation is performed using annual cross sections or using an iterated distance variable. Proposed solutions to the more traditional "distance puzzle" in international trade literature, including balancing the data, mitigate the severity of increasing effects of distance on trade costs, but do not solve this new puzzle.

DO BUSINESS SCHOOL TEAM PROJECTS MEET STUDENT LEARNING OUTCOMES AND PREPARE STUDENTS FOR THE WORLD OF WORK

Dr. Michael Latta (Coastal Carolina University- YTMBA Research & Consultig), Mr. Merrill Boyce (Coastal Carolina University), Mr. P R (Dick) Drass (Coastal Carolina University), Mr. David Fink (Coastal Carolina University), Dr. J. Kay Keels (Coastal Carolina University)

The new AACSB standards have brought change to the definitions of Student Learning Outcomes (SLOs). One of the key questions for business schools raised by these changes is: why are team projects important?~ Typically, schools of business are not focused on educating theorists or academics, but rather on future practitioners who will work in businesses that have structured and unstructured teams.~ If team work in the “real world” is so important, then teamwork in business classes must add value; otherwise, the business school fails in its mission.~ It is important for business schools to recognize the opportunity to utilize teams as a teaching tool that can be assessed effectively. ~However, the teamwork experience must have value beyond the classroom; otherwise, the quality and capability of graduates is not enhanced.

Does Mindfulness Have a Place in Business Organizations?

Dr. Lissa Velazquez (Roanoke College)

The purpose of this paper is to discuss the literature related to incorporating mindfulness strategies into the work place. First mindfulness will be defined. The benefits of mindfulness will be outlined. A listing and descriptions of mindfulness programs in a number of well known and respected business organizations will be offered. Some of the downsides that have been offered by critics will be summarized. A conceptual framework for researching mindfulness in the work place will be offered followed by possible future research questions. It will be useful for the author to hear what her esteemed colleagues can suggest regarding the future research ideas.

EDUCATING COLLEGE BOUND MILLENNIALS: LEVERAGING TECHNOLOGY TO ENGAGE AND EDUCATE STUDENTS

Dr. Mahesh Vanjani (Texas Southern University)

Generation Y, sometimes referred to as "Millennials'', "Echo Boomers'', or jokingly as "Generation Why?'', refers to the cohort of individuals born, roughly, between 1982 and 1994. The millennial generation, like others before it, has been shaped by the events, leaders, developments and trends of its time. However, the emergence and use of technology has had the most defining impact on this generation. For the millennial college bound students' technology has always been a part of their lives. They have advanced technical skills, are adept at finding information, multitasking, and, tend to have shorter attention spans. The rise of instant communication and content creation technologies, and, new media used through video based websites such as YouTube and social networking sites may explain Generation Y's reputation for being peer oriented and for seeking instant gratification. They are voracious consumers of technology and use it for education and entertainment. Educators will need to adapt from providing education to providing edutainment to stimulate and engage this generation of learners. College professors will have to get creative in leveraging technology to engage, motivate and educate this generation of students. In order to be effective educators we must understand our audience and the world they inhabit. This includes trying to understand what factors influence and motivate our students and appreciate that different generations' have their characteristics and habits that mold how they learn and how they respond to their teachers. Each generation has a different approach to learning and, as educators, we need to adapt to provide the appropriate learning environment via relevant and effective teaching strategies.

Effect of Knowledge Management (KM) on Organizational Success

Ms. Lisa Baez (Savannah State University)

~ ~Knowledge management practices can impact the success of customer relations management within an organization if it used correctly. Implementing this strategic tool effectively can provide an organizational competitive advantage. Employing KM practices may not be the only factor that will contribute to the positive outcomes of the organization's financial performance, but it can help an organization implement the appropriate type of practices that can help the business become successful. Provided with the appropriate information managers can learn to design KM strategic practices that can help them achieve higher innovation, effectiveness, efficiency and profitability for their companies. The main focus of this research study is to reveal the connections between the use of knowledge management practices and the positive outcomes of the organization. The questions that will be addressed within this research study are: \begin{itemize} \itemsep1pt\parskip0pt\parsep0pt \item What is Knowledge Management (KM)? \item Why does using KM practices matter for the company's bottom line? \item How can using KM enhance corporate culture? \item What are the implications and benefits that KM may have? \end{itemize} ~~~~~~~~~~ \emph{Keywords}: knowledge management (KM), customer relations management (CRM), strategic programs, innovation, effectiveness, efficiency, competitive advantage.

Effective use of Software for Statistics Instruction

Dr. Robert Andrews (Virginia Commonwealth University), Dr. Julian Parris (JMP), Mr. Patrick Barbera (Pearson)

Presenters will demonstrate the use of their software to help students learn and engage with core concepts in statistics and data analysis ranging from introductory statistics to analytics procedures. MyStatLab software helps to manage and individualize the learning and evaluation process through several capabilities such as auto-graded Excel based exercises.~ JMP examples will include simulations to demonstrate foundational topics such as the sampling distribution of the mean and outlier influence to how interactivity of a visualization can illuminate the output of unsupervised machine learning algorithms for clustering, and how dynamic and responsive graphics can be used to teach core design principles in effective data visualization.

Electronic Word of Mouth in Social Media: Effects on Businesses

Mr. Troy Jones (Savannah State University)

Social media sites such as Facebook, Twitter, Instagram, YouTube, etc., have become prevalent over the last 5 years, the typical face-to-face meaning of word of mouth, is starting to switch to an electronic word of mouth (eWOM). Electronic Word Of Mouth (eWOM) is executed through tweets, posts, pins, and video reviews just to name a few. This study investigates how eWOM is beginning to effect businesses in both positive and negative ways. In particular, this research focuses eWOM's impact on businesses and its subsequent effect on customer trust, brand relationships, and customer-brand loyalty. The research addresses the following questions: \begin{itemize} \itemsep1pt\parskip0pt\parsep0pt \item What is eWOM? \item How does it truly effects businesses? \item How can businesses control eWOM in order to gain customer trust and loyalty? \end{itemize} \emph{Keywords: eWOM, Social Media, Businesses, Control, Customer-Brand Loyalty}

Enhancing the Value of Analysis through Effective Skills and Communication

Dr. Mary Malliaris (Loyola University Chicago), Dr. Mary Dunaway (University of Virginia), Dr. Robert Andrews (Virginia Commonwealth University), Prof. Wilma Andrews (Virginia Commonwealth University)

A chain is no stronger than its weakest link. Knowledge of current analysis methods and developing the ability to communicate effectively with others who have a different knowledge base can be weak links in the preparation for statistics and analytics analysis.~ Panel members relate their experiences to work on improving student knowledge of statistics and analytics methods as well as their communication skills.~ Effective communication includes learning to ask the proper questions to truly understand the problem being analyzed and finishes with communicating what will be of value to the audience when analysis results are presented. ~\\

ETHICAL PERSPECTIVES ON THE EXTENT OF SOCIAL RESPONSIBILITY IN SUPPLY CHAIN MANAGEMENT

Dr. Ryan Atkins (Nova Southeastern University)

Recent supply chain management research has acknowledged the importance of balancing social and environmental responsibility with economic performance {[}5{]}. The decisions made by supply chain managers can have a far-reaching impact on the economic, environmental, and social performance of the entire supply chain, even though many activities that occur in the supply chain are not under the direct control of those managers {[}1{]}. Some firms draw a line of moral disengagement, beyond which they distance themselves from the social and environmental impact of the activities of the supply chain {[}2{]}, while others rely on suppliers to take a leading role in enforcing responsible practices {[}4{]}. \\\\We draw upon ten ethical perspectives to provide insight into how far along the supply chain the line of moral responsibility should be drawn, and whether it should be drawn at all. We argue that the ten perspectives converge to three primary approaches to managing social responsibility in supply chains: a. internal focus; b. stakeholder focus; and c. extended stakeholder focus. Several issues are discussed with regard to the application of these approaches, including the focal firm's power to control the actions of supply chain partners and the interplay among legal, moral, and financial responsibilities. Triple bottom line arguments may be inadequate to fully address the implications of the decision to take actions toward social responsibility or sustainability, as they often prioritize the economic dimension {[}3{]}. This research discusses the ethical and moral implications of those decisions, and in doing so, provides insight to managers and researchers alike.\\\\REFERENCES\\\\{[}1{]} ASGARY, N. \& LI, G. Corporate Social Responsibility: Its Economic Impact and Link to the Bullwhip Effect. Journal of Business Ethics, 2016, 135(4), 665-681.\\{[}2{]} ERIKSSON, D. \& SVENSSON, G. The Process of Responsibility, Decoupling Point, and Disengagement of Moral and Social Responsibility in Supply Chains: Empirical Findings and Prescriptive Thoughts. Journal of Business Ethics, 2016, 134(2), 281-298.\\{[}3{]} MONTABON, F., PAGELL, M. \& WU, Z. Making Sustainability Sustainable. Journal of Supply Chain Management, 2016, 52(2), 11-27.\\{[}4{]} WILHELM, M. M., BLOME, C., BHAKOO, V. \& PAULRAJ, A. Sustainability in multi-tier supply chains: Understanding the double agency role of the first-tier supplier. Journal of Operations Management, 41, 2016, 42-60.\\{[}5{]} ZORZINI, M., HENDRY, L. C., HUQ, F. A. \& STEVENSON, M. Socially responsible sourcing: reviewing the literature and its use of theory. International Journal of Operations \& Production Management, 2015, 35(1), 60-109.

Exit, Voice, and Loyalty: Some Academic Factors as Institutional Antecedents of Student Success in U.S. Universities

Dr. Avinandan Mukherjee (Clayton State University), Mr. C. Julian Gnana Dhas (Sri Krishna Arts and Science College), Ms. Heather Chaney (Clayton State University)

Student success has long been considered as the "holy grail"of enrollment management in higher education. Student success generally refers to students persisting to completion of their educational goals. The most frequently cited variables to measure student success are: student retention (freshman-to-sophomore retention rate or first year annual return rate) and time to graduation (four-year cohort graduation rate, and six-year cohort graduation rate). Student retention rate in the context of U.S. higher education is defined as the percentage of first-time full-time students enrolled at the university the following Fall semester. The four-year student graduation rate is defined as the percentage of an entering class that graduates within four years with a baccalaureate degree. The six-year student graduation rate is defined as the percentage of an entering class that graduates within six years with a baccalaureate degree. Extant research is replete with predictor variables that have been shown to influence student retention or graduation. For example, student retention is influenced by financial aid, parents' education, the number of semester hours enrolled in and dropped during the first fall semester, developmental education programs, internet-based courses, and participation in the Student Support Services program (Fike and Fike, 2008). Other factors identified are: High School GPA, Gender, SAT/ACT, Race/Ethnicity, High School Rank, Household Income, First-Semester (-Year) College GPA, First Generation, College Gateway "Killer" Courses, Loan Aid, Gift/Grant Aid, Transfer/Commuter, Work Study Aid, Student Need, Big Five Personality Traits, Locus of Control, Self-Esteem/Self-Efficacy, and Student Readiness Inventory (Hanover Research, 2011). Lopez-Wagner, Carollo, and Shindledecker (2010) found that the predictors of retention for at-risk students are: Ethnicity, high school GPA, University Studies 100 enrollment, first term GPA, percent of courses completed during the first year, and number of general education courses enrolled during the first year. However, there are three gaps in the existing research in this area. First, retention and graduation rates have mostly been studies separately, with their own set of antecedents, thus making it difficult to comate between the two. Second, the published research in this field has mostly been conducted at the individual student level, and not at the institutional level. Third, we consider academic factors as antecedents to student success in our model, which differentiates it from other research that have focused on demographics, socio-economic factors, and student services and other support factors. The purpose of this research is to understand the effects of a common set of academic factors on student retention and graduation rates at the institutional level in U.S. higher education. More specifically, we explore, using secondary data, the individual and interaction effects of seven academic factors: Enrollment, Student-Faculty Ratio, Percent classes with fewer than 20 students, Average Net Price, Socio-Economic Diversity, Salary after Attending, and Percent of Full-Time Students, on three outcome variables: 4-year graduation performance, 6-year graduation performance, and student retention rate. The theoretical background of this research is based on the Exit, Voice and Loyalty theory (Hirschman, 1970). Three separate regression models were tested, one each for each of the three dependent variables.

Experiences with and Recommendations for using R for Statistics/Analytics Instruction

Dr. Robert Andrews (Virginia Commonwealth University), Dr. Buddy Bilbrey (Lander University), Dr. Tobin Turner (Presbyterian College), Dr. David Stephan (Two Bridges Instructional Technology)

R was the top software in the 2016 KDnuggets Software Poll that asked practicing professionals what software they used for Analytics, Data Mining, Data Science, and Machine Learning projects in the past 12 months. The presenters in this session will report on their experiences with teaching statistics and analytics procedures using R software.~ This will include the R integration features in JMP and discuss reasons for using R from inside JMP.

Exploring Security Considerations in Service Environments

Dr. Shona Morgan (North Carolina A & T State University), Dr. Rhonda Hensley (North Carolina A & T State University)

The open literature has shed little light on how to conceptualize security provisions in services. This research uses previously developed service and production positioning matrices as an input for the development of a service security typology.~ Three service processes are critically examined in relation to their security risk and difficulty.~ We believe the typology offers service industry practitioners a first step in developing appropriate service security measures.

EXPLORING WEB AND MOBILE DEVELOPMENT KNOWLEDGE, SKILLS AND ABILITIES: A CONSENSUS-BASED PILE SORT METHODOLOGY

Mrs. Sam Wainford (Georgia Southern University), Dr. Adrian Gardiner (Georgia Southern University), Dr. Cheryl Aasheim (Georgia Southern University), Dr. Paige Rutner (Georgia Southern University)

The increasing use of mobile devices, availability of wireless Internet, and growing consumerism on the web have created a need for information technology workers with the knowledge, skills and abilities to meet the demand for responsive websites and mobile applications. The proposed research will analyze a corpus of job advertisements—using both automated and non-automated methods—to provide a contemporary review of the most in-demand web and mobile development job skills. The results of this study can be used by educators in designing curriculum that address the current needs of industry in terms of information technology workers.

Gender Discrimination in the Workforce: Its Impact on Businesses and Employee Performance

Ms. Janeth Gabaldon (Savannah State University), Ms. Yashikiya Harley (Savannah State University), Mr. Jerry Greene (Savannah State University), Dr. Suman Niranjan (Savannah State University)

This paper investigates the association between gender discrimination in four workplace areas; recruitment policies, job performing, managerial roles and wage with employee performance and firm performance in the workplace. It was hypothesized that each independent variable is positively correlated with firm performance and employee performance as independent variables in this model. Using a sample size of one hundred ninety-two (192) participants six scales were statistically measured, which include Gender Discrimination in Recruitment Polices, Gender Discrimination in Job performance, Gender discrimination in Managerial Roles, Gender discrimination in wages, employee performance and firm performance. Structural equation modeling is used to evaluate the hypotheses. Results indicate that employee performance is significantly correlated with Gender Discrimination in Recruitment Polices, job performance, and managerial roles. Also, firm performance is significantly correlated with Gender discrimination in recruitment policies and job performance.\textsubscript{}\\

Gini-based Classification and its Applications in Data Mining

Dr. Binshan Lin (Louisiana State University Shreveport)

Gini-based classification is a rank-based classification, which takes into account both the variate values and the ranks. The methodology relies only on first order moment assumptions hence it is valid for a wider range of statistical distributions. This paper begins with reviewing formulation types of Gini-based classification and surveys the main properties, efficiency, and selection biases. Gini-based classification under independent censoring and co-variate-dependent censoring are reviewed as well. Several empirical evidences for variable selection bias with the Gini-based classification from the literature is presented. We then discuss statistical explanations for variable selection bias in different settings by identifying several main sources of variable selection bias, such as estimation bias, variance effects and multiple comparisons effect. Gini-based classification method can be modified to overcome the bias problems, by normalizing the Gini indexes with information about the splitting status of all attributes. Related literature reviews on Gini-based classification and detection are compared. Practical applications of the Gin-based classification are discussed in terms of big data analytics and artificial intelligence for medical diagnoses. Gini-based classification can be extendible to categorical and ordinal predictor variables and to other split selection criteria in data mining. The paper outlines several future research opportunities for Gini-based classification. Several challenges remain in the area of modeling of classification, clustering and detection using Gini-based classification, many of which require efforts from various discipline groups. Our paper is interdisciplinary and makes contributions to both the Gini literature and the literature of statistical inference of performance measures in data mining.~

Grouping Students According to IT-Related Ethical Behavior: An Application of the Clustering Algorithm

Ms. Sushmita Khan (Georgia Southern University)

Information technology is widely used by college students. However, the extent to which students are ethical when using Information Technology is questionable. In an attempt to understand the ethical use of Information technology, this study is developed. This study is concerned with the students' knowledge and intent to act ethically. In order to do so, the data is collected by the distribution of a survey. Development of the survey is not within the premises of the study. The survey replies are coded into numerical values. The data is further processed and prepared for the application of the mining algorithm. This study aims to categorize students into groups according to their knowledge level. In order to so, Microsoft clustering algorithm is applied. The results reveal students with the highest ethical knowledge acts least ethically.

GUIDELINES FOR EVALUATING THE VALIDITY OF A STATISTICAL STUDY IN A GENERAL EDUCATION STATISTICS COURSE

Prof. Aniekan Ebiefung (The University of Tennessee at Chattanooga)

A statistical study could be biased or invalid even when conducted by a researcher with a good reputation. It is the responsibility of the reader to critically examine a study's conclusion for accuracy and to discover hidden biases or invalid conclusions. In this paper, we give some guidelines that students can use to critically evaluate the validity of the methodology and conclusion of a statistical study.

GUIDING VALUES AND THE COLLECTIVE UNDERSTANDING OF COLLEGE STUDENTS

Dr. Janice Black (Coastal Carolina University), Dr. Jacob Voegel (Coastal Carolina University)

Mission statements are used to guide the action of individuals within an organization. Such guidance is more readily accepted if it aligns with an individual's identity. One way to determine potential for alignment is to determine if values align. However, basing such evaluations on just a word choice may not result in an alignment if individuals have different meanings assigned to the same words. As an ethical issues in business then, we need to determine the degree of agreement about word definitions of value words which are a shorthand way of sharing of concepts that are used to guide action and belief. \\.\\This paper looks at the degree of agreement among graduating seniors from a college of business for their collective agreement about the definitions of a beginning set of value words. The work finds significant agreement across almost all of this initial set of value words. There is some confusion for the words: collaborate and cooperate. This encourages us to confirm other value words used in mission statements or as extensions of mission statements that intend to guide the actions of organization members.

HAS THE SUPERIOR COURT OF BRUNSWICK COUNTY, NC ESTABLISHED A SYSTEM OF INJUSTICE THAT DISCRIMINATES AGAINST PRO SE LITIGANTS IN A MANNER THAT VIOLATES THE SUBSTANTIVE DUE PROCESS CLAUSE OF THE FOURTEENTH AMENDMENT TO THE U.S. CONSTITUTION?

Dr. Brad Johnson (Francis Marion University)

The primary purpose of this article is to enhance the awareness of pro se litigants that the Superior Court of Brunswick County, North Carolina may have established a system of injustice that discriminates against pro se litigants in a manner that violates the Substantive Due Process Clause of the Fourteenth Amendment to the U.S. Constitution. In this regard, the instant article has significant public interest not only for pro se litigants, but also for any person associated with the legal community as well as legal scholars.\\ Specifically, this article argues that the procedural posture of the case study reveals that the Superior Court of Brunswick County, North Carolina (NC) has established a system of injustice that discriminates against pro se litigants in a manner that violates the Substantive Due Process Clause of the Fourteenth Amendment to the U.S. Constitution. More specifically, through an analysis of the procedural posture of the case study, this article shows a system of injustice established by the Superior Court of Brunswick County, NC that is applied to a pro se plaintiff.\\In a case study approach, the three primary objectives of this article are:\\(1) To establish the procedural posture of the case study;\\(2) To establish the law at issue; and\\(3) To apply the law at issue to the procedural posture of the case study for the purpose of identifying U.S. constitutional implications for the pro se plaintiff.\\This article argues that if these objectives are met, the procedural posture of the case study reveals that the Superior Court of Brunswick County, NC has established a system of injustice that discriminates against pro se litigants in a manner that violates the Substantive Due Process Clause of the Fourteenth Amendment to the U.S. Constitution. In this regard, the instant article has significant public interest not only for pro se litigants, but also for any person associated with the legal community as well as legal scholars.\\In a case study approach, this article accomplishes its primary purpose and objectives in a stepwise fashion as follows.\\• In Part I, the procedural posture of the case study is established.\\• In Part II, the law at issue is identified.\\• In Part III, the law at issue is applied to procedural posture of the case study actual for the purpose of identifying U.S. constitutional implications for the pro se plaintiff.\\In Part IV, implications of the findings in Part III for pro se litigants, persons associated with the legal community, and legal scholars are presented.

Held for Ransom, the Latest Cybersecurity Threat

Mrs. Elizabeth Lowry (Bon Secours Health System, Inc.)

The year 2016 saw the emergence of a new cybersecurity threat called ransomware. This form of malware continues to raise challenges to protecting the security and integrity of data in all organizations. In many instances, employees within the organization unknowingly permit access to outsiders who then gain control over the data sources and demand payment of money to release the data. This paper addresses ways organizations can resist, detect, and respond to ransomware attacks.\\\\As more and more organizations face the consequences of ransomware attacks, one thing stands clear: they are not prepared. They are not prepared to identify potential threats, protect against or detect unwanted access, or have adequate response and recovery protocols. Following a framework to prepare for such attacks, such as the NIST (National Institute of Standards and Technology) Framework for Improving Critical Infrastructure Cybersecurity, can reduce their incidence, or at the least, their impact.\\\\This paper identifies the most common weaknesses and threats arising from ransomware attacks. They include an investigation of the existing security controls and their enforcement, the access to rapid and effective recovery of lost data through back-up systems, protocols for recovery from attacks, and coverage provided by third-part insurers. Important to this discussion is the recognition that ransomware is only the latest malware attack and these mitigation approaches may prepare organizations for the “next” form of attack. This suggests that organizations must remain vigilant, but also agile in their efforts to protect themselves. \\\\Examples and suggestions for ways to detect and protect the organization’s data and systems will be provided. Key areas will include sources of security breaches and a checklist of methods to mitigate the risks.

Heuristic solution improvement using optimization

Dr. Robert Nauss (University of Missouri-St. Louis), Dr. Jeremy North (Murray State University)

Heuristics continue to be an important tool for generating good feasible solutions for both integer programs and for problems that may be ill-structured and/or nonlinear. Such ill-structured problems may in fact not even be able to be formulated as formal optimization problems. However, when some variables are fixed at particular values, a “reduced’‘problem may be solvable using standard approaches. For example, the original problem may be highly nonlinear, nonconvex, and/or of such a size that a formal solution algorithm may not exist or at best takes a large amount of CPU time and resources (and may not guarantee a global optimal solution).\\ In this paper, we restrict our inquiry to classes of hard integer linear programming problems. “Hard’‘is defined as a problem that cannot be solved to optimality in 1 hour of CPU time with the use of “off the shelf’‘optimization codes (GUROBI, CPLEX). \\ We consider the generalized assignment problem (GAP) initially. The GAP may be described as finding a minimum-cost assignment of tasks (m) to agents(n) such that each task is assigned to exactly one agent and such that each agent’s resource capacity is not violated. \\Hard GAP problems often have the property that integer feasible solutions are relatively easy to generate with some ad hoc procedure and/or integer feasible solutions are generated as a by-product in the branch-and-bound search. We capitalize on this property by collecting the feasible solutions generated and keep them in the order of descending objective value. Suppose we have a collection of feasible solutions and select a number (say 4) of those solutions with the smallest objective values. Identify those variables in common equal to 1 in each of the four solutions. Let L be the set containing these variables. If \textbar{}m\textbar{} - \textbar{}L\textbar{} is sufficiently small, we have a “reduced size’‘GAP, where \textbar{}L\textbar{} variables are locked at the value 1, that can probably be solved to optimality in a short amount of CPU time. The resulting solution may be an improvement on the best known feasible solution or it may not. If it is an improvement, we add this to the list of feasible integer solutions and continue the branch-and-bound procedure. In either case we may add a cut ∑(all xij in L) xij \textless{}= \textbar{}L\textbar{}-1. If the “reduced size” GAP cannot be solved to optimality within say 5 minutes, the cut is not valid. However, if an improved feasible solution is found, it can be added to the ordered solution list. We then return to the branch and bound search over the original problem. Computational results are included.

Heuristics in Business and Economics

Dr. Reza Kheirandish (Clayton State University), Dr. shabnam Mousavi (Johns Hopkins University)

According to Gigerenzer and Gaissmaier (2011), “Heuristics, are efficient cognitive processes, conscious or unconscious, that ignore part of the information”. In this view, heuristics are simple rules of thumb that can be successfully used in situations of irreducible uncertainty and complexity. The more dominant view of heuristics, heuristics and biases, studies instances where people make less than rational or biased judgments, and attaches these instances often to the use of heuristics. In their initial research, Tversky and Kahneman (1974) argued that three heuristics, namely availability, representativeness, and anchoring and adjustment can be used to explain the processes underlying a wide range of intuitive and often fallible judgments. Interestingly, social scientists are not the only group, or the first group, who use and study heuristics. Engineers, computer scientists, and mathematicians, as well as theoreticians in many scientific fields have been using heuristics, simple rules, and rules of thumb extensively as strategies for problem solving. Gathering the ways in which different fields define heuristics and spelling out the similarities and differences between these definitions is a theme of this paper. The other, more specific goal is to survey the different conceptions of heuristics stemming from different psychological approaches to human decision-making processes. The paper demonstrates which concepts have or have not been extended to economics and other business disciplines. It specifies instances where the study of adaptation, use of heuristic strategies, and less-than-rational behavior is modeled in behavioral economics. It argues that in cases where the predominant conception of heuristics has been adopted in behavioral economics, the implications for understanding and describing decision processes can be traced back to the traditional neoclassical economic theory of rational decision-making. Finally, it illustrates the ways in which the less explored extension of simple heuristic strategies to economic behavior holds operational promises, which can shed light on our understanding of puzzling behavior in economic markets. Examples from the prevalent use of simple rules in entrepreneurial domain provide a fruitful area for turning the focus of the study of heuristics from being a source for biased judgment to a functional way of treating the actual problem at hand.

How Accountants can Fight Activist Investors

Dr. Dov Fisher (Brooklyn College)

The case of the socially disruptive breakup of the century-old Timken provides an example of how accountants could have exercised creative leadership to push back against self-interested constituencies who manipulated accounting data. Accountants can exercise creativity in educating decision makers about the uncertainty inherent in accounting estimates. Accountants can present information in a nuanced manner that will pierce the illusion that there is a single rational choice. By presenting information in a creative and nuanced manner, accountants can empower decision makers to make courageous, reasonable choices that balance financial realities with the public interest.

How much time should be spent on each of the four major areas of competency in the new MSIS 2016 model curriculum?

Dr. Albert J. Wynne (Virginia Commonwealth University), Mr. Joseph T Cipolla (Virginia Commonwealth University), Dr. Elena Olson (Virginia Commonwealth University)

The purpose of this paper is to present findings of a study to determine the percentage of the Master of Science curriculum in information systems that should be allocated to each of the four major areas of competency in the MSIS 2016 Model Curriculum. These competency areas include: Individual Foundational, Computing, IS Management, and Domain. A focus group comprised of alumni, industry representatives, and faculty/staff using the World Café approach arrived at consensus time allocations that represent the emphasis that should be placed on the four major competency areas. This is especially important because we offer two different masters programs. The first is a traditional course semester approach and the second is a weekend, executive module approach. Both programs have the same learning outcomes but different emphasis. The results of the study are being used to guide curriculum planning.

Impact of Business Climate and Quality of Life on Employment of South Carolina: Evidences from Panel Cointegration, GMM, Dynamic OLS (DOLS) and Dumitrescu Hurlin Panel Causality Tests

Dr. Muhammad Mustafa (South Carolina State University), Dr. Haile Selassie (South Carolina State University)

This paper explores the impact of quality of life and business climate variables on employment of South Carolina using county level panel data for the years 1980 through 2015. The methodologies used include panel Cointegration, Dynamic OLS (DOLS), FMOLS, GMM and Dumitrescu-Hurlin panel causality test. The panel cointegration tests and error-correction estimates indicate long-run equilibrium relationship among the variables. The panel Dynamic OLS and GMM estimates show capital investment, education, vehicle registration have significant and positive, while poverty has significant and negative effect on employment. The GMM and FMOLS estimates indicate crime rate has negative effect on employment. The Dumitrescu Hurlin panel causality tests indicate that there is bidirectional causality between wage, capital investment, poverty, number of vehicle registration, and employment. \\\\Key Words: Employment, Wage, Poverty rate, Child-Death Rate, Education, Dynamic OLS, GMM, ECM, Panel Coitegration, Dumitrescu-Hurlin Causality

Impact of WeChat Use among Cancer Patients' Informal Caregivers: An Exploratory Intervention Study in China

Dr. Lucky Xue (East Carolina University), Ms. Hanxi Zhang (Fudan University), Dr. Ming Yuan (Jiangyin People's Hospital), Dr. Huigang Liang (East Carolina University)

The treatment for cancer increasingly requires patients' informal caregivers (ICGs) involved throughout the disease trajectory. This can cause a great deal of psychological burden to the lives of ICGs. Through a 10-week smart-phone based social media intervention program, this study investigates ICGs' usage patterns of social media and the impacts of such a program to ICGs' strain and self-efficacy levels.

IMPROVING THE INVENTORY POLICY OF A LOCAL BUSINESS IN NORTH CAROLINA

Mrs. Marilene van Schalkwyk (Fayetteville State University), Ms. Caitlin Ray (Fayetteville State University), Mr. Dhruv Kalas (Fayetteville State University), Dr. Burcu Adivar (Fayetteville State University)

This study is based on an inventory problem of a local sauce distributor, which is based in North Carolina and having high costs due to excess inventory, high inventory turnaround time, inaccurate forecasts, and small production lot sizes. As in every business, the proper utilization of inventory with maximum service level have been unattainable success factors for this local company as well. It is important to ensure that inventory is effectively being used and, particularly with perishable items, products are not being wasted. Our objective is to provide quick solution that will help the management accurately process orders and anticipate the amount of sales per month to be able to best handle the demand. We reviewed four years of historical sales and inventory data, analyzed the trends, and developed forecasts with the goal to advise the client on best practices for inventory planning going forward. We developed a new inventory policy to reduce total costs and inventory stock keeping time. After implementing the results, the management was able to see a quantified analysis of the shortcomings in their current forecasting method and gained good insights through the information analyzed to understand the shortcomings in their current inventory policy. They adapted the seasonality with trend forecasting model for future sales of all their flavors. The biggest economic benefit for the company was the insight the management has gained regarding the impact of business analytics.

Including Activity-Based Costing Constructs in a Survey of Accounting Course

Dr. Bill Pollard (Appalachian State University)

Activity-based costing (ABC) is currently a widely-used multiple-based costing method that students will likely encounter in the workplace. Coverage of a detailed, broad-based analysis of ABC, while very desirable, is likely not possible for students taking a survey of accounting course (often taken by non-business majors) due to the ever-competing plethora of topics deemed essential in the business curriculum.~ However, including at least a brief discussion of the theoretical determinants of ABC in the survey course, as well as a basic analysis of the workings of ABC is essential since accurately determining the cost of a product is often basic to the successful operation of a business. In this paper, an overview of costing a product is first presented, followed by an illustration of the use of ABC.

Influence of graph presentation format on user's decision making behavior

Dr. Dong-gook Kim (Dalton State College), Dr. Chongwoo Park (Augusta University)

Graphs provide rich pattern information that are generally more understandable than tabular forms. However, individuals can be often misled by distorted graphs (e.g., Pennington and Tuttle 2009), and there are many forms of distortion. For example, the Y axis of a graph does not begin from 0 or adding depth shading to make 2 dimensional (2D) graphs to look like 3 dimensional (3D) ones. We call the latter form of distortion pseudo 3D (P3D) graphs, which has 3D effect on 2D graphs. That is, the data set for the graph is 2D in nature, and P3D graphs, therefore, do not carry any more information than their 2D counterparts. P3D graphs can affect users' perception often in a negative way and, therefore, are not generally recommended (e.g., Tufte, 2001). However, the use of such graphs is prevalent in schools, advertisement, business, Web, and so on. This can be attributed partly to the ease of producing such graphs in one of the most popular graphing software—Microsoft Excel (Su, 2008). Past studies found the poor user performance of P3D graphs (e.g., Carswell, Frankenberger \& Bernhard, 1991; Tversky \& Schiano, 1998). Kelton et al. (2010) suggest multiple representations (e.g., graphs and tables) to mitigate the negative effects of distorted graphs, such as P3D graphs. In this paper, we study the decision making behaviors of subjects when they are given P3D graphs vs. 2D graphs in experiments. In the first experiment, we test if subjects using P3D graphs are to interpret the underlying pattern differently from those using 2D graphs. In the second experiment, subjects can purchase additional information, which is a table of the data used to draw the graph. We test if subjects in the P3D group is more likely to purchase the second piece of the information than those in the 2D group. A subject will go through multiple iterations of the same task with different data in each time. Along with their responses, we measure the speed of their responses in the experiments. In both experiments, we design the task that prefers graphs to tables according to the cognitive fit theory (Vessey, 1991). Students in regional universities in the southeastern US will be participants of the experiments that will be performed in computer labs. An important implication is whether or not the use of pseudo 3D graphs is justified, especially when people may prefer P3D graphs if they try to impress others (Tractinsky \& Meyer, 1999).

Information Systems Undergraduate Curriculum: A Study in Self-Assessment for Program Viability

Dr. Albert J. Wynne (Virginia Commonwealth University), Dr. Elena Olson (Virginia Commonwealth University)

ABSTRACT\\The purpose of this research is to report the results of a self-evaluation study conducted by the Department of Information Systems; School of Business, Virginia Commonwealth University (VCU) to assess the relevancy of its undergraduate curriculum relative to the current state of IS field and competitiveness among its peers as defined by the AACSB and ABET accrediting organizations. The methodology used in this study is based on the methodology employed in a study of the department's masters in information systems program and reported at the Southern Association for Information Systems Conference in the spring of 2016. Specifically, the study's methodology followed the following dimensions:\\• The data collected and analyzed included comparable, competitive, and aspirant programs' undergraduate curriculum as identified by our current program accrediting bodies, AACSB and ABET.\\• The compiled data from the comparable, competitive and aspirant programs, along with the VCU IS undergraduate program was mapped to the latest ACM/AIS Undergraduate Curriculum Model (2010).\\• Identified trends in information technology and systems methodologies were used to assess the impact on changes in curriculum content such that the curriculum would more accurately reflect the skill sets need to prepare students to become qualified entry-level IS professionals.\\• Findings were presented at the IS Department's Undergraduate Curriculum Committee.\\• Results from a Focus Group consisting of the current IS students, faculty, recent graduates, alumni who graduated within the past five years, and the local leading technical recruiters, was used to validate the results of the internal evaluation. \\• A review and discussion of the study's findings at the 2017 SEDSI during the presentation session are to be included in the final report to the IS department and IS Advisory Board.\\\\In addition to assessing the viability of the IS undergraduate curriculum, the study also provided an opportunity to examine the role the IS department plays in supporting the School of Business' strategic plan referred to as EPIC (Experiential Learning, Problem-solving Curricula, Impactful Research, and Creative Culture). EPIC introduces a new framework; CREATE (see Figure 1: image could not be displayed in submission) for implementing the school's multiple curricula. This framework provides a problem-solving structure that students can take from the classroom into the business world. An operational guideline for how the department's undergraduate curriculum will support the new school's strategic plan through the CREATE framework will be presented. This extensive self-assessment initiative is designed to ensure the validity and applicability of the education provided by the department in the volatile IS field. A full report will be presented at the 2017 SEDSI Meeting.

INVOLVEMENT OF PROFESSORS IN ACADEMIC PURSUITS IN RETIREMENT–A SYMPOSIUM

Dr. Robert Herring (Winston-Salem State University), Dr. Jim Pope (Duale Hochschule Baden-Wuerttemburg), Dr. Brooke Saladin (Wake Forest University), Dr. Albert J. Wynne (Virginia Commonwealth University)

The symposium addressed the “hows” and “whys“ of academic and professional engagement of college and university professors in retirement. Perspectives of those recently retired as well as those approaching retirement were presented and discussed. The emphasis of the symposium was on audience participation and a guided discussion of the various issues and opportunities to be faced in remaining engaged in retirement. By such sharing of pursuits the participants gained ideas of activities which they might find of interest in retirement.

Is China's Economy Impacted by the Dynamics of Oil Prices?

Dr. Zhixin Kang (University of North Carolina at Pembroke), Dr. Bishwa Koirala (University of North Carolina at Pembroke), Ms. Wenhui Chen (China University of Geosciences - Beijing)

China is the second largest oil importer in the world as of 2015. How China's economy reacts to shocks in oil prices has been an important research topic. Existing literature shows that there are significant relationships between major China's macroeconomic indicators such as GDP, interest rate, export, and the shocks in oil prices. However, there is a void in the literature about whether these major macroeconomic measures in China would react to the shocks in oil prices homogenously or heterogeneously across the whole domain of the shocks in oil prices. Our study focuses on this topic. Specifically, we explore whether there are different impacts of oil price changes in the level and oil price volatility on China's major macroeconomic indicators such as GDP, export, household consumption, and government consumption. Using quarterly data and multivariate time series modeling framework, we estimate and test the significance of these impacts in different information regimes. The information variables in this study are oil price changes and oil price volatility. Furthermore, we employ impulse response analysis in each regime identified from the multivariate time series model to investigate the dynamics of the impacts of oil price changes and volatilities.

Knowledge sharing - an imperative for successful supply chain collaboration - An empirical Analysis

Ms. Anu Mathews (Anderson University)

Supply chain collaboration is an emerging concept in a dyadic and extended network for generating the competitive advantage by participants; however, knowledge sharing among participants in the collaborative network is a significant parameter to achieve this strategic benefit. This paper is a systematic literature review on the significance of knowledge sharing in supply chain collaboration for\\B2B and B2C among dyadic and extended supply chain participants, published over a 10-year period from 2005 to 2016, and empirical analysis is performed to hypothesize the method for successful knowledge sharing in SCC based on nature of collaboration.

LENGTH DISTRIBUTIONS AND DYNAMIC BUFFER SIZING IN MULTI-SERVER QUEUEING SYSTEMS

Dr. Daniel Myers (Rollins College)

Multi-server queueing models are common in several areas of operations research, including manufacturing systems, call centers, and computer networks. Many researchers have studied analytic approximations for multi-server queueing~systems, particularly the estimation of average waiting times in systems with non-exponential service distributions. However, simulation still remains the preferred technique for many problems involving multi-server queues,including problems of resource allocation in systems with finite\\storage buffers.\\\\This talk presents new analytic approximation techniques for the queue length distributions in M/G/1 and M/G/c queues. The derivations are based on the fundamental laws of queuing systems and require only the first two moments of the service time distribution. Comparisons to simulation estimates show that both approximations are accurate for a range of practical systems, including those with high utilizations and high service time variability.\\\\Multiple authors have used Little's Result to derive a relationship between the queue length and residual service times. We first adapt these results\\to derive a two-moment approximation formula for the M/G/1 queue length distribution. This result has several desirable properties: it requires only the mean and variance of the service time distribution rather than the complete moment-generating function, it is exact for M/M/1 systems, and it can be used to recover the exact mean queue length.\\\\Extending the single-server approximation to multi-server systems, we observe that, from the perspective of a customer waiting in line, waiting in an M/G/c queue is like waiting in an M/G/1 queue with service rate multiplied by a factor of c. Therefore, it is possible to derive an expression for the queue length in a multi-server system that has a form similar to the single-server approximation. Simulation experiments show that this approach is accurate~for many practical systems, including queues with dozens of servers and high service time variability.\\\\The conclusion of the talk features a presentation of new research in progress on dynamic buffer-resizing in systems of multi-server queues. Many systems are constrained by a limited amount of storage that must be shared among a series of production centers. For example, in a job shop, there may be a limited amount of buffer space for work-in-progress that must be allocated among different production lines. Therefore, efficient techniques for reallocating buffer space in response to changes in load are of both practical and theoretical interest.\\\\The key result of this section is the use of the multi-server queue length approximation to estimate the blocking probability for M/G/c/b~queues, drawing on heuristics developed by Tijms. We will also discuss potential applications and open problems related to analytic buffer sizing models.

Lessons Learned and Data Resources for Quantitative Analysis and Statistics Instruction

Dr. Robert Andrews (Virginia Commonwealth University), Dr. William Miller (Georgia College), Dr. Chris Lowery (Georgia College), Dr. Ping Wang (James Madison University), Dr. Binshan Lin (Louisiana State University Shreveport)

Presenters share the knowledge they have learned from quantitative analysis and statistics classes taught traditionally and online.~ The session will address suggestions for engaging students and encouraging learning as well as presenting a list of publically available free databases suitable for instruction in statistics and analytics classes.~ Attendees will be encouraged to participate in the discussions and express their interest in using, contributing to and helping maintain a list of publically available databases. ~~

LIKE THE DESERTS WISH FOR RAIN, AMERICA'S LOCAL ECONOMIES WISH FOR MANUFACTURING: LOCAL ECONOMIES MUST REINVENT THEMSELVES

Dr. Stacy Barnes (Averett University)

The purpose of this paper is to discuss modern globalization effects on U.S. local communities. Many analysts contend that over the past several decades the economic and social impacts in small town America have been both shocking and destructive. Others contend that the promise of globalization for middle and small town America has created an avenue for capitalists and money changers to ravage the most sacred of America's exceptionalism; that of the promise to grow middleclass opportunities with shared prosperity, cooperation and fairness. And although globalization and free-enterprise are apparently a very successful economic revolution, it seems to have contributed to the denigration of rural and small town America's labor dynamism. Nevertheless, a resurrection and gainful opportunities for local economies is feasible. Specifically, this paper focuses on one local community, the city of Rocky Mount in the state of North Carolina, USA; its circumstances and how the city's recovery both economically and socially hinges on reinvention. \\\\ Modern multinational manufacturing serves only the self-interest of the owners and is certainly the mantra of the day; that the public interest; local people (competitive/cooperative entrepreneurs and small businesses); who presumably operate in the public interest or the community's interest appear to not account for very much; at least in isolation. As such, many local economies seem to be suffering from past miscalculations and continue to reason that large multinationals and globalization will come to the rescue. The challenge is they rarely do and are not likely to do so in the near term; if ever. It is because free enterprise and private ownership of production (in the context of tremendous market power) permits the movement of operations to locations with the lowest cost of production. In the simplest terms, it means that lower labor costs and associated technologies assist in swift relocations. Consequently, small localities are left with a disparate and dwindling tax base, low wages and basically economies that have created jobs that are less than authentic or dependable; all of which has brought forth massive public debt as well as private debt; including student debt, credit card debt and healthcare debt.

Managing Conflict When Your Workplace Does Not Have a Program

Dr. JUDITH OGDEN (Clayton State University)

Conflict in the workplace is inevitable. There are many potential causes for workplace conflict, including personality clashes, stress, and heavy workloads. Many people would even say that some conflict is good for change and growth. ~However, it can also lead to a variety of problems, not the least of which is employee dissatisfaction, and the desire to leave the company. ~Some believe that as the use of teams increases, the incidence of conflict will also increase. ~Research indicates that dysfunctional conflict can be costly.~ It results in time being wasted, lower productivity, absenteeism, and lower motivation. Many companies have established programs to deal with conflict and these may include components such as a formal or ad hoc policy, a conflict management person, a committee or department, an ombudsperson, voluntary or mandatory policies on mediation and arbitration, grievance procedures, panels of internal or external neutrals, or a neutral fact-finder. However, some workplaces have no such program.~ The reasons for this involve a concern for the costs of developing and running a program, fear of causing conflict to escalate, too much attention focused on minor problems, and suspicion about these programs on the part of the employee and employer. Even if no program exists, conflict probably does. An individual involved in conflict and looking for a solution must first ask him or herself several questions: Are you a manager or supervisor? Are you directly involved in the conflict or just impacted by it?~ If you are directly involved, with whom is the conflict, i.e., A co-worker or a supervisor? If you are not involved in the conflict, do you have the time and the skill to participate? ~ The answers to these questions will determine a course of action. This paper will suggest and discuss various techniques addressing those answers.

Maximizing Asset Recovery: Establishing a Disposition Decision Tool

Dr. Kim Whitehead (Anderson University), Dr. Edmund Prater (University of Texas at Arlington)

Driven by both internal and external pressures, organizations are becoming skilled in the art of reverse logistics. Some of these have adopted reverse logistics voluntarily while others are participating due to governmental pressures and financial risk. This paper contributes to the literature by focusing on the asset disposition decision step in reverse logistics.~ Efficient and effective disposition decisions are key both to recovering the maximum economic value from returned assets and insuring social responsibility.~ Addressing the need for management tools, this paper proposes asset recovery selection criteria and performance measures that can be used to evaluate and compare disposition options.~

MBA Program Portfolio Approach to Assist Students in Career Transition

Dr. Linda Christie (Marymount University)

Many MBA students aspire to make a career change upon the completion of their graduate degree. In fact, these "planned for''and "hoped for" career transitions are often a leading motivating factor driving MBA program enrollment. MBA program design can facilitate this transition by helping students tell their individual stories of where they have been, what they have done, and what they hope to do in the future. By using tools for career discovery during orientation and presenting a portfolio model at the start of their MBA studies, students are encouraged to consciously create a comprehensive set of experiences throughout their coursework which will enable their eventual career transition. Specifically, students are encouraged to strategically choose projects and opportunities throughout their MBA education which will build their network of contacts in their chosen field, add to their portfolio of practical learning, and advance their career preparation. Rather than thinking of each project as a stand-alone course requirement, students are instructed to design these experiences to build on each other. In the middle of the MBA program, students enroll in a management course where they are provided with additional opportunities for career exploration. In the final capstone course of the MBA program, the portfolio model is revisited as students present their individualized portfolios to their classmates. This approach serves to connect student experiences throughout the MBA program. Graduates are able to maximize the value of the choices they make within individual courses to attain their career goals upon completion of the MBA degree.

Medical Battery: When Patient Rights Conflict with Quality of Care

Dr. Claire La Roche (Longwood University)

An important legal issue with potential ethical, monetary and patient care implications involves the revocation of informed consent and the potential for a lawsuit based on medical battery. In performing medical or surgical procedures, healthcare providers frequently are told to "stop" by patients. Sometimes these situations involve patients attempting to avoid something as simple as installation of eye drops or a part of a routine medical examination. For instance, a claim was brought against an ophthalmologist for failing to remove an automatic blood pressure cuff during a procedure to remove a small mass from a patient's lower lid. Medical battery is discussed. Case law involving the revocation of informed consent is reviewed. The author conducted a 2015 Healthcare Survey of healthcare providers and the results are analyzed. Ethical considerations are discussed and suggestions are made for recognizing situations in which a physician should stop a procedure and thus avoid a potential legal conflict.

MONITORING TECHNOLOGY IN YOUR LIFE: A WORK IN PROGRESS

Dr. Pamela Galluch (Roanoke College), Ms. Marta Miller-Serrano (Roanoke College), Dr. Chris Lassiter (Roanoke College)

Contemporary information technologies are pervasive in the workplace. While our IT-reliant lifestyle has had a dramatic impact on business productivity it has also caused technology-induced stress, termed technostress. When working properly, information technology streamlines work and improves efficiency of an organization. However, when information technology malfunctions, some workers can find themselves in complete disarray, technostressed, and unable to perform, while others find workarounds and still maintain performance. We know very little about how individual differences affect technostress. This study argues that being stressed is not always the same as feeling stressed, or an individual's physiology does not necessarily correlate to his or her psychology when working on online tasks. More specifically, we believe that personality can cause individuals to over- or under-react to techno-stressful situations and thus at times cry wolf when complaining about the affect work has on their stress level. To do this, we seek to examine four personality characteristics that we believe explains the most variance in both stress and strain: locus of control, social desirability, fear of negative evaluation, and propensity to worry to see how they correlate with perceived stress, objective strain, and performance. The results provide insight into how personality differently affects stress, strain, and performance.

Multi-Objective Preventive Maintenance and Replacement Scheduling in a Manufacturing System using Goal Programming

Dr. Kamran Moghaddam (Clayton State University)

This research presents a new multi-objective nonlinear mixed-integer optimization model to determine Pareto-optimal preventive maintenance and replacement schedules for a repairable multi-workstation manufacturing system with increasing rate of occurrence of failure. The operational planning horizon is segmented into discrete and equally-sized periods and in each period three possible maintenance actions (repair, replacement, or do nothing) have been considered for each workstation. The optimal maintenance decisions for each workstation in each period are investigated such that the objectives and the requirements of the system can be achieved. Total operational costs, overall reliability and the system availability are incorporated as the objective functions and the multi-objective model is solved using a hybrid Monte Carlo simulation and goal programming procedure to obtain set of non-dominated schedules. The effectiveness and feasibility of the proposed solution methodology are demonstrated in a manufacturing setting and the computational performance of method in obtaining Pareto-optimal solutions is evaluated. Such a modeling approach and the proposed solution algorithm could be useful for maintenance planners and engineers tasked with the problem of developing optimal maintenance plans for complex productions systems.

Neuromarketing and Psychology in Advertising: Exploring Connections

Ms. Amber Evans (Savannah State University)

The main focus of advertising is to market to specific audiences based on products, services, or simply consumer behaviors. This research is to evaluate the effectiveness of neuromarketing in the world of advertising while also exploring the multiple ways it has already been used to connect with customers. In the world of marketing and advertising, neuromarketing is utilized to probe into consumers' minds of better decision making. The study addresses the following questions: \begin{itemize} \itemsep1pt\parskip0pt\parsep0pt \item What is neuromarketing? \item How does it affect marketing? \item How do psychology and marketing balance each other in advertising? \end{itemize} \emph{Keywords: Neuromarketing, Advertising, Psychology, Functional Magnetic Resonance Imaging (fMRI), Marketing}

No - Business Intelligence Is Not An Oxymoron Or A Big Data Technique

Dr. Michael Latta (Coastal Carolina University- YTMBA Research & Consultig)

Business education current practice prepares students for analysis with tools such as Strengths, Weaknesses, Opportunity, and Threats (SWOT Analysis). Data Analytics and Predictive Modeling have become popular, and now we hear about Data Science with the advent of big data.~ As faculty show students how to help business organizations solve real-world problems with these advanced analysis tools, they need to understand how to integrate the softer side of Business Intelligence into business analysis practice. These softer skills include Knowledge from Education, Practical IQ, Emotional IQ and Interpersonal IQ. Taken together they define Business Intelligence which is highly useful in both academic assignments like internships and on the job after graduation.

No One Is as Smart as Everyone – A Japanese Proverb: The Story of a High-Performing Work Team A Case Study

Dr. Stan Vinson (Lander University Greenwood South Carolina)

In 1998 a rapidly growing manufacturing company hired a new Vice President of Operations. While his responsibilities were very traditional, as one of his "duties as assigned"he was privileged to lead a work team that promoted and installed what was to be called the "Employee Ownership Program". This case study is written from the perspective of the team leader and done after interviewing all the team members and reviewing the documentation supporting the team's activities.

Opportunities and Perils: Launching a Micro Business

Dr. Joshua Brooks (Lander University Greenwood South Carolina), Mr. Alan Treeter (Lander University Greenwood South Carolina), Dr. Stan Vinson (Lander University Greenwood South Carolina)

This paper seeks to bridge the gap between a number of new lines of research in microenterprise entrepreneurship with practical advice from practitioners in the small business space. We divide the issues related to launching a small business into two distinct components: feasibility and sustainability. A large body of research points to the fact that many small business struggle to incorporate well-known business practices into their startup and ongoing strategy. In addition to outlining advice for entrepreneurs we also give a comprehensive literature review of this area of research.

OPTIMIZATION OF EMPTY CONTAINER MOVEMENTS FOR FREIGHT FORWARDERS

Dr. Burcu Adivar (Fayetteville State University), Ms. Didem Hepgulum (DSV - Global Transport and Logistics)

Management of the container movements is critically important for seamless integration of logistics and supply chain processes. Any disruption in transport, storage and movement of empty containers, namely, empty container management may pose problems for both liners, carriers, transport organizers or forwarders. In a highly competitive maritime industry, carriers carry the heaviest cost burden in case their shippers' empty container demand is satisfied on time. In case of empty demand shortage, typically forwarders provide alternative carrier service which have available empty containers on site. Therefore, tracking and monitoring real-time demand and supply of empty containers for carriers become complex and critical issue for transport organizers, or forwarders. Therefore, in this study, we focus on the empty container management problem from the transport organizer's or forwarder's point of view. By examining the relevant container management process with all relevant factors and dynamics, we develop an optimization model which aims to minimize the the total cost of empty container movement. The results of the proposed model are demonstrated with numerical data from a real logistics company.

PERCEPTIONS OF COLLEGE STUDENTS ON MEDICAL TOURISM

Dr. Lydia Gan (University of North Carolina at Pembroke), Dr. James Frederick (University of North Carolina at Pembroke), Dr. Donna Wiencek (Western Illinois University)

This paper studies the perceptions of Americans who seek medical care outside the United States. Convenience cluster sampling was conducted on two college campuses between March 2013 and May 2014. Respondents provided 401 usable responses, which included socio-economic data and data about their perceptions of medical tourism.~ Principal component analysis yielded three factors – risk, vacation, and social-related. This paper tests hypotheses about Americans' motivation to use foreign care by regressing these three factors on thirteen consumer variables.~ The findings of the paper include: ~(1) The well-insured were more sensitive to risk factors than the less-insured in terms of their willingness to travel for care. (2) The better-educated were less likely than those with less education to be motivated by risk factors. (3) Those who were proficient in a foreign language, on the other hand, were less sensitive than those who speak only English to risk factors but the reverse was true when it came to social-related factors. (4) Relative to the whites, the blacks were less sensitive to risk factors. Medical tourism potentially can ease the strain of the healthcare systems in developed economies and it can restrain healthcare inflation.~ How well it achieves this will depend on how well these factors are addressed by policy makers.~~

Perspectives on Statistics Instruction for Analytics and Data Science

Dr. Robert Andrews (Virginia Commonwealth University), Dr. Zhixin Kang (University of North Carolina at Pembroke), Dr. Joan Donohue (University of South Carolina), Mr. Andrew Bristow (Virginia Commonwealth University), Dr. Lydia Gan (University of North Carolina at Pembroke)

Should the traditional Business Statistics course be revamped to cover more topics and content related to the emerging analysis disciplines of Business Analytics and Data Science? Presenters will discuss their perspectives on this important question.~ The American Statistical Association endorsed Curriculum Guidelines for Undergraduate Programs in Data Science will also be considered as part of the discussion in this session.

Posterior worst-case bounds for LPT schedules

Dr. Johnny Ho (Columbus State University), Dr. Ivar Massabo (Universita della Calabria), Dr. Giuseppe Paletta (Universita della Calabria), Dr. Alex Ruiz-Torres (Universidad de Puerto Rico - Rio Piedras)

This paper proposes and analyzes a posterior tight worst-case bound for the Longest Processing Time (LPT) heuristic for scheduling independent jobs on identical parallel machines to minimize the makespan, and makes remarks that improve the well-known posterior worst-case bounds previously proposed in the literature when the makespan is realized on multiple machines. Our theoretical and computational comparative analysis shows that the proposed bound can complement the well known posterior bounds to synergistically achieve a better posterior worst-case bound for the LPT heuristic. Moreover, the proposed bound can be used to further show that LPT schedules are asymptotically optimal.

PREDICTING IMDB SCORE: AN APPLICATION OF DECISION TREES

Mrs. Geanna Torres (Georgia Southern University), Ms. Kennitha Cochrum (Georgia Southern University), Mr. Jonathan Covington (Georgia Southern University), Ms. Tiffany Carpenter (Georgia Southern University)

The purpose of this project is to identify film attributes that influence the Internet Movie Database (IMDb) rating of a movie. Internet Movie Database or IMDb, is a searchable database that has a plethora of data about movies and various entertainment programs and the IMDb rating can be used to measure the success of a movie. The goal was to show that a film's cast and crew social media popularity has a large impact on the IMDb rating of said film. This was done using a data mining tool called Microsoft SQL Server Analysis Services (SSAS). The Decision Tree algorithm was applied to the dataset and it became apparent which attributes had the biggest influence on the IMDb rating. This project will provide valuable information that will help when making a movie watching decision.

PREDICTING THE TOP THREE FINISHERS OF THE 2016 KENTUCKY DERBY USING LOGISTIC REGRESSION

Mr. Andrew Bristow (Virginia Commonwealth University), Mr. Shane Olson (Virginia Commonwealth University)

There are many methods of predicting or forecasting within the realm of multivariate statistical analysis. Different methods are suitable for different purposes.~ The aim of this study was to apply logistic regression analysis to effectively build a model that predicts whether a given horse might finish in the top three places of a race. Logistic Regression modeling is one of several multivariate tools available to analyze complex data in order to find patterns and relationships that may not be apparent otherwise.~ The power of this method is the ability to predict outcomes or classifications of future events or observations.~ Logistic regression works with continuous and/or discrete predictor variables to find the probability of group membership for the response variable based on predictor variables. In this project we were interested in whether or not a particular horse in the Kentucky Derby would finish in the top 3. In building our data set we limited our data to only the information that would be available pre-race to the average individual.~ By using logistic regression we were able to create a model that incorporated six different independent variables.~ The model correctly produced the highest probabilities for the top 3 finishers for the 2016 Kentucky Derby. In further testing we examined the difference in prediction accuracy between logistic regression and decision tree models for both the Kentucky Derby and the Preakness Stakes.~

PRODUCTIVITY-DRIVEN APPROACH TO INTEGRATED BIOMASS-TO-BIOFUEL SUPPLY CHAIN DESIGN

Prof. Jae-Dong Hong (South Carolina State University), Ms. Shadae Taylor (South Carolina State University), Mr. Devin Rambert (South Carolina State University)

Contrary to the traditional cost-driven approach (CDA), we consider productivity-driven integrated biomass-to-biofuel supply chain (IBtBSC) design problem, where productivity is defined as the ratio of output to cost. The IBtBSC design problem should deal with two objectives, such as cost minimization and production maximization, would lead to improved productivity for biofuel through the supply chain. To design more balanced IBtBSC, a goal programming (GP) approach was used by several researchers by simultaneously taking several performance metrics into consideration in the formulation. A case study is conducted to evaluate and determine relative productivities of the performances of all alternatives generated by GP, and identify the best options among them by applying productivity-driven approach (PDA).

PROJECT PORTFOLIO SELECTION AND SCHEDULING IN FUZZY CONDITIONS USING A TWO-STAGE MODEL

Dr. Tahereh Heydari (iran university of science and technology), Prof. Seyed-mohammad Seyedhoseini (iran university of science and technology), Dr. Tahmineh Nategh (Islamic Azad University, Shahrood branch)

Because of limited resources, organizations often have to make decisions regarding selecting and scheduling of a project portfolio among the candidate projects. A poor decision might negatively affect the organization in two ways: On the one hand, organizational resources are spent for weak and non-strategic projects, leading to the loss of time and resources, on the other hand, the organization lose the profit which could be gained by investing the resources in more profitable projects (opportunity cost). Hence, selecting a rich portfolio has been always an important concern of project managers. In real world, selection is complicated by uncertainty in input data, thereby making selection and scheduling more complicated. In this article, a two-stage model is presented for portfolio project selection in fuzzy condition; in the first stage, projects are ranked using qualitative and quantitative criteria through fuzzy TOPSIS, and in the second stage, higher rank alternatives, are selected and scheduled concerning restrictions.

Providing Students with Proper Knowledge and Skills for Analytics and Big Data

Dr. Robert Andrews (Virginia Commonwealth University), Dr. Cory Hutchinson (Louisiana State University), Dr. Kellie Keeling (University of Denver), Dr. Robert Stine (University of Pennsylvania)

These experienced faculty share their classroom experience that will include foundational tools and capabilities such as Microsoft PowerPivot, SQL, Tableau, R and communicating statistical results with graphs. ~They will additionally cover important foundational concepts that are easy to overlook when analyzing large data sets.~ There are subtleties that we often move past too quickly but need to be considering in the world of big data.~ Those tiny p-values might not indicate as much statistical significance as their size suggests!

PROVIDING WHAT STUDENTS NEED; NOT WHAT IS EASIEST FOR FACULTY: IN-DEPTH STRATEGIC ASSESSMENT OF THE STRATEGY COURSE

Dr. Janice Black (Coastal Carolina University), Dr. J. Kay Keels (Coastal Carolina University), Dr. Nicholas Rhew (Coastal Carolina University)

This paper examines the Millennial and iGeneration student groups and, taking the perspective of building a better strategy course, integrates student needs, employer needs, and faculty needs. We examine common preferences of the Millennial student (found in many of our graduate programs) and iGeneration student (our currently emerging undergraduate student\ldots{} a bit more extreme than the Millennial student). These characteristics and then their preferences in pedagogy act as a general contextual background. Next, we review some of the current literature addressing academic and employer expectations. We, finish our review, by examining behaviors and attitudes that may be triggers for both positive and negative faculty evaluations by the iGeneration and to a lessor extent by the Millennial. From those triggers, we make suggestions on changes to a current Strategic Management offering, including revisions to its syllabus, changes in delivery, and changes in outreach to students that may enhance the faculty member's chance at a positive evaluation. More effort by the faculty, more meeting the needs of the student; less focusing on least amount of effort in teaching practices.

Qualitative examinations of supply chain collaboration and their contribution to the research stream

Dr. Kim Whitehead (Anderson University)

This research presents a systematic review of the literature on qualitative examinations of supply chain collaboration. Qualitative research is essential to our understanding of how supply chain collaboration is executed and managed by and between supply chain partners. Qualitative research provides rich content data that allows researchers to use techniques such as those employing exploratory, narrative and phenomenological methodologies. Through a thorough review of the literature over the last ten years from 2007-2016 this paper seeks to answer the following research questions: R1) What are the most significant contributions of qualitative research to the supply chain collaboration research stream? R2) What are the key qualitative methods that are used in supply chain collaboration research? and, R3) What are the emerging gaps and opportunities for qualitative research regarding supply chain collaboration? There are few literature reviews regarding supply chain collaboration and, to date, there are none that explore specifically qualitative research in this literature stream. By learning more about the employed qualitative methodologies and their focus, we seek to provide researchers with data to support ideas for future research, propose new research questions and give insight into the journals and outlets that are publishing qualitative research in this area. Ultimately, this paper seeks to expand of our understanding of how qualitative research has been utilized in studying supply chain collaboration and explore ways that these methods can be used to continually improve our understanding of this important supply chain management phenomena.

Repeatability and Reproducibility: A Study to Analyze the Precision of Assessing Tooth Preparations

Dr. Kimberly Deranek (Nova Southeastern University), Dr. Steve Kramer (Nova Southeastern University), Dr. Sharon Siegel (Nova Southeastern University)

Key components of tooth preparation for indirect dental restorations (crowns) include adequate tooth reduction and smooth surface finish. Tooth preparations have been traditionally assessed and grades awarded through visual inspection, and the judgement and expertise of faculty. Because of subjectivity and potential inconsistencies, faculty utilize tools to calibrate the scoring process whenever possible. This becomes important as National Board Dental Examinations are considering using CAD/CAM (computer-assisted design and computer-assisted manufacturing) scanners and software for assessing indirect restoration preparations for licensure. The purpose of this research is to assess the intra-observer repeatability and the inter-observer reproducibility quality outcome measures for tooth preparations to evaluate scoring process consistency. \\\\Material and Methods: Onlay and crown preparations were scored across six dimensions: occlusal reduction, anatomic form, finish line, axial reduction/internal box form, path of draw, and preparation finish using a standardized scoring rubric. Quality outcome standards associated with a (double blind) sample of 50 teeth produced by third-year dental students as part of a CAD/CAM course were assessed and grades assigned (for each dimension per tooth, three times each, randomly sequenced) by two faculty members. Preparation depth (axial reduction) was evaluated using standardized depth dimensions (2 mm) with a periodontal probe and rounded angles were assessed using an explorer. A standardized depth gauge was used to measure occlusal clearance/reduction (2mm functional cusp (fc), 1.5mm non-fc). An ordinal measurement system was used to evaluate each tooth with a letter grade (A through F). Statistical analysis was done using Kendall's Coefficient of Concordance (W) ranging from 0 to 1. A coefficient value of 1 indicates perfect agreement while a coefficient of 0 indicates the agreement is random.\\\\Results: Research revealed a significant difference in evaluator repeatability and reproducibility levels across dimensions. Faculty members' intra-observer repeatability was highest for repeated measurement of occlusal reduction, axial reduction, and finish of prep, though in all instances measures could only be classified as marginally acceptable (W=0.7 to \textless{}0.9). Measures in the other three categories were deemed unacceptable (W\textless{}0.7). Reproducibility was found to be generally weaker than repeatability across dimensions. Reproducibility measures were deemed marginally acceptable in one dimension (W=0.7 to \textless{}0.9) and unacceptable (W\textless{}0.7) across the remaining five dimensions.\\\\Conclusion: Despite the expertise and diligence of the faculty members, the study revealed a significant level of inconsistency associated with visual grading tooth preparations using a grading rubric even with calibrated tools. Our findings yield important details of grading variance associated with the grading dimensions both within and between evaluators. The results suggest that visual inspection as a grade measurement system is insufficient for assessing student tooth preparations and that a more objective measuring system through the use of CAD/CAM preparation scanning may be more repeatable and reproducible. Further research is needed.

Resources for Teaching Sustainabiltiy

Dr. Marilyn Smith (Winthrop University)

Teaching sustainability to business students begins with introducing the triple bottom line (people, profit, and planet), and immediately emphasizing the interrelationships between people, profit and planet. That is, organizations will not consider these separately, but rather look at ways to increase profit (perhaps by reducing cost), at the same time they are benefiting people (employees, customers, the community), while if not improving the planet conditions, at least making sure they are minimizing future harm. Google Images provides a wealth of illustrations, mostly colorful Venn diagrams, to show the interrelationships by either searching by "triple bottom line of sustainability"or "triple bottom line people planet profit". The workshop will discuss resources such as the UN Global Compact, Dow Jones Sustainability Indices, ISO, Energy Challenge,US Green Business Council, state agencies, simple example cases, GoodGuide, journal articles and books, while inviting participants to share their experiences.

Retirement Analysis

Dr. Ajay Aggarwal (Henderson State University), Dr. Frank Smith (Colorado State University)

This study considers the net worth of the current generation at the retirement age of sixty five. Using government statistics on factors shown to affect income such as race, gender, life expectancy, education, inheritance, debt, savings rate, and stock returns, a Monte Carlo simulation is used to derive a model that estimates an individual's net worth at age sixty five. The study is unique in that it considers the impact of ethnicity on retirement.

Salary Expectations and Salary Realities: An Analysis of University Students in Spain and Singapore

Dr. Amit Shah (Frostburg State University), Dr. Michael Monahan (Frostburg State University)

One of the main reasons for attending an institution of higher education is to gain the requisite knowledge and skills to obtain employment. While there has been abundant research on post collegiate employment in the USA, the researchers sought to investigate perceptions and trends in other countries. The researchers chose two disparate countries which have seemingly nothing in common. The two countries differed in size, population, GPD and most importantly, their unemployment rate. The first is Singapore which is a very small country with @ 6 million inhabitants, however it has a low 2\% unemployment rate and is ranked 6th in the world in terms of GDP which is estimated to be @ \$85,300. Conversely, the second country is Spain which has a population of 48 million but has high unemployment as their rate 23\%. Further, Spain's GPD is ranked 94th at @ \$34,800. \\\\The selection process students use to choose where to work is comprised of many factors. While each of these has their own advantages and disadvantages, the question arises as how much each of these is valued by prospective employees. Items such as job security, benefits, advancement, autonomy, responsibility, can mean as much as pay. How students preparing to enter the work force rank these factors can provide insights into what the students' value and provide employers with assistance in determining what incentives to offer. \\\\However, the level of pay is often paramount? The researchers sought to find if the amount of starting pay varied by the sector where the student sought employment and ascertain if a disparity between what a prospective new employee perceives they will earn versus the amount of money they feel they will actually settle on earning.\\\\The following research hypotheses guided the study.\\H1: There is no difference in where students from Singapore and Spain would like to find employment (Private Industry, Public Service, or Starting their own or take over a family business)\\H1a: There is no difference where students would like to find employment on the basis of Gender, Personality Type, and Major\\H2: There is no difference in the job selection factors favored by students from Singapore and Spain.\\H2a: There is no difference in the job selection factors favored by students from Singapore and Spain on the basis of Gender, Personality Type, and Major\\H3: There is no difference in the amount of money (in percent) that students from Singapore and Spain hope to earn and the amount they will reasonably accept \\H3a: There is no difference in the amount of money (in percent) that students from Singapore and Spain hope to earn and the amount they will reasonably accept on the basis of Gender, Personality Type and Major\\\\\\A total of 460 usable responses from students from the two countries were obtained. Statistically significant differences emerged and implications will be discussed. The remainder of the paper will focus on answering the research questions with statistical analysis and conclusions for practice.

Short-term Travel to China: Planning and Pitfalls

Dr. Michelle Hagadorn (Roanoke College), Dr. Chris McCart (Roanoke College)

Almost all college campuses across the country now have international education offices to assist students from other countries, while also promoting study abroad and short-term travel courses. The primary premise is that exposing students to other cultures will improve their critical thinking and decision making skills while ultimately improving their intercultural competence. As boundaries between countries blur for business and trade, improving these skills is important for students to be successful in a global economy. The purpose of this paper is to describe the process involved in creating and implementing a short-term travel course to China. In addition, a planned survey of participants will be described.

Should Strategy Researchers Use Data Envelopment Analysis?

Dr. william kline (Pennsylvania State University - Harrisburg), Dr. Fang-Chun Liu (Stevens Institute of Technology)

Management as a field draws on theory and tools from mother disciplines of economics, psychology, political science and sociology (Mudambi, Hannigan, and Kline, 2012). Armed with a diverse set of theoretical frameworks, management scholars examine a wide range of business issues and emphasize various units of analysis. One commonality is the need to examine various system inputs and outputs in the quest to best measure individual, group, or firm-level performance. For example, in the strategy domain, scholars often struggle with the selection of the appropriate output or performance measure (Miller, Washburn, \& Glick, 2013). In some cases scholars measure output as revenue or net income, while in others rely upon ratios such as return on assets or return on equity. However, when examining the determinants of core strategy concepts, competitive advantage for example, frontier methodologies such as data envelopment analysis (DEA) may be more meaningful than traditional measures of performance (Chen, Delmas, \& Lieberman, 2015).\\\\DEA is a statistical method that draws on production function tenets to calculate efficiency measures based on input/output ratios and "has emerged as a preeminent methodology for assessing the relative efficiency of decision-making units.‘' (Fizel and D'ltri, 1999, p. 570) Key word searches for "DEA" yield thousands of articles covering wide-ranging topics from marketing benchmarking (Donthu, Hershberger, and Osmonbekov, 2005), to sports management (Howard and Miller, 1993), to education (Mayston, 2003). Despite the sound foundation for DEA logic and applications, as well as a thirty five-year track record and wide acceptance in a number of fields, the usage of DEA in mainstream management literature and management business curriculum remains scarce.\\\\We endeavor to spark a debate among management scholars with respect to the relevance and applicability of DEA methodology in the strategic management domain. We reviewed the broader management literature and identified what appear to be isolated pockets of DEA usage. Given this, an opportunity exists for scholars to examine the contexts in which DEA has been successfully utilized, as well as how such usage could contribute to theory development in untapped management literature streams.

Small Business Meets the World of Social Media

Ms. Alexis Baird (S)

This paper will discuss how small business can value from the use of social media. Over the last five to ten years' social media has been used to be one of the cheapest and most effective ways to advertise and promote small businesses. During the planning stages of a small business, when decided on how they business will be promoted and advertised social media is one of the first outlets to be discusses. Social Media has the ability to connect a small business with not only existing customers but a group of potential new customers. Business can also use social media to develop business to business communication and relationships. Social media gives one the ability to connect with those locally and globally. Social media can also be used as a tool of research for not only the consumers but for businesses as well. There are so many different platform/ social media sites out there that there is not but potential for a small business to grow and expand. Since social media is not tangible many wonder who will they see their growth. Well, there are many social media tools that help small business be able to track and give useful data about their social media sites to help the company become more dynamic which just helps the brand grown and expand. With all of the different social media sites, there are plenty of opportunities to become creative with how your businesses brand it advertised. Social media can give small business the opportunity to have as many connections as large cooperation's. \textbf{Key words:} social media, social media tools, social media outlets, business to business, business to consumer, customers,

Social Media Advertising: Xenophobia and Implications on Interpersonal Closeness with Foreigners

Ms. Rafaella Gavino (Savannah State University)

\textbf{Social Media Advertising: Xenophobia and Implications on Interpersonal Closeness with Foreigners} Companies are heavily relying on social media to promote their products. In a globalized world, advertisements are expected to include multiple ethnic groups and races, however this is still not a reality; some social media advertising campaigns portray foreigners under stereotypes, enhancing ethnocentrism and consequent xenophobia. This research investigates the impact of social media xenophobic advertisements on Interpersonal Closeness (IC) with foreigners while proposing ethnic inclusion in advertisements as a trigger to Xenocentrism, the attraction toward foreign products. \textbf{Keywords:}\emph{social media, stereotypes, xenophobia, ethnocentrism, xenocentrism}

SOME DRIVE-THRU'S ARE 'MORE EQUAL THAN OTHERS'

Ms. Teresa Fábregas (Mount St. Mary's University), Mr. Kevin Kelly (Mount St. Mary's University), Mr. Martin Grenchik (Mount St. Mary's University)

In this paper we examine drive-thru performance in fast food restaurants. How do you know if a drive-thru is performing well? Quick Service Restaurants or QSR have accounted for flow time. However, is this the appropriate performance measure? When flow time is used, it's missing the goal of the drive-thru. While the drive-thru is meant to be quick, it's main purpose is to make money. When flow time is used, it does not account for inventory (cars waiting in line). Therefore, a more appropriate performance measure is flow rate; how much money a fast-food chain is making? Through this measure we are able to determine a fast-food chain's customer capacity by identifying the bottleneck.

Stimulating Creativity Through Mindfulness Practices Within the Information Systems Curriculum

Mr. Nibal Aridi (Virginia Commonwealth University), Ms. Ginny Ross (Virginia Commonwealth University)

Mindfulness has become an increasingly important practice established within workplaces to stimulate creativity and organizational awareness. Mindfulness is referred to as the process of engaging in the present and being aware of your surroundings to raise levels of focus (Batalo, 2012). Due to the increase in complexity of IT use, mindfulness has specifically become prominent in the field of information technology and computer science to counteract hypersensitive technical environments. High-reliability organizations, such as air traffic control systems, naval aircraft carriers, and nuclear power operations, are critically dependent on seamless IT performance since the slightest technology or system error can send the organization to a crumble. Organizations as such are required to respond to potential threats by sustaining high levels of mindfulness (Valorinta, 2009). IT leaders within these organizations are engaging in mindful practices to improve their managerial conduct. This mindful engagement by leaders can spur IT innovation within one's organization to reveal dynamic perspectives in workplace performance and decision making~(Lu, 2010). In this paper, we research various technology organizations to recognize, classify, and rank the use and impact that mindful practices have on the organization. By analyzing the behaviors of the organization's technology leaders and current industry cultures, we look to identify the best practices that help technology organizations maintain sustainable levels of mindfulness. The identified practices will be incorporated into the environments of Information Systems classrooms to aid the students in developing cognitive skills necessary in preparation of the future IT leader's career track within modern organizational cultures. The increase of mindful practices by Information Systems students is expected to increase their perceptions of creativity and tendencies to learn in their educational curriculum and long-term professional career (Lourenço, 2011).

STRATEGY VERSUS STRUCTURE: A CREATIVE ENTREPRENEURIAL PERSPECTIVE

Dr. Janice Black (Coastal Carolina University)

ABSTRACT\\As strategy began to influence scholarly research, Chandler argued; strategy precedes structure (Chandler, 1962). Changes in strategy required changes in business structure (witness the multidivisional firm of the 1960s). Certainly this sequence was supported by others across time (Ansoff, 1965; Amburgey \& Dacin, 1994; Galan \& Sanchez-Bueno, 2009). However, other scholars have questioned this sequence and have proposed other supported alternatives (Bower, 1970; Hall \& Saias, 1980; Fredrickson, 1986). This paper proposes the entrepreneur's orientation towards structure and strategy can be reveal metaphorically.

Tax Policies that Encourage Tenant Medical Office Building Green Utility Retrofits

Dr. Billie A Brotman (Kennesaw State University)

Abstract\\This paper exams the financial impact of upgrading an existing medical office building with an energy efficient design or equipment from a tenant/lessee perspective. The empirical study highlights the importance of utility cost, credit availability and producer price index for office construction on the amount of medical office building spending put in place. The independent variables prime interest rate, cost of natural gas per therm and electricity cost per KWH are significant variables. A cost-benefit model is developed that inputs several personal income tax rates, incorporates a debt-service coverage ratio, analyzes investment tax credit and rebate scenarios and varies the level of energy savings. The cost- benefit case study results provide insight into which factors enable higher net construction spending when considering a green energy retrofit project. Both the regression model and the case study model focused on the tenant who rents medical office space using a triple net lease. The tenant paradigm limits the analysis to energy savings, the tax implications of having these savings and benefits associated with borrowing when financing the green retrofit. The availability of low cost borrowing and increased investment tax credit (ITC) rates increases net retrofit construction spending.

Teaching Cost Accounting: A Focus on Bad Debts and Purchases Discounts in the Cash Budget

Dr. Bill Pollard (Appalachian State University)

This paper presents materials that have been used in the classroom to teach cash budgeting procedures and which, based on exam results, have helped students better understand the workings of a cash budget. ~An overview of the cash budget is first presented, followed by problems involving projected cash collections and budgeted accounts receivable, first without and then with bad debts.~ A focus on budgeted cash payments (and accounts payable balances) is next presented, first without and then with purchases discounts.~ These areas capture the key determinants in the cash flow of a business and are crucial in forecasting and then maintaining adequate liquidity for effective business operations.

TEACHING DATA VISUALIZATION WITH TABLEAU: CASE OF "TOPBABYNAMES"

Dr. Helen Moshkovich (University of Montevallo), Dr. Alexander Mechitov (University of Montevallo)

The effect of Big Data growth is felt everywhere. It is especially affecting how organizations are conducting their business to stay competitive in the market place. The term "Big Data"is commonly used to data sets that are too large and/or too complex to be processed by traditional approaches. Data science is now a thriving area of research which forms new ways of dealing with the problem. As a result business schools pay more attention to business analytics which incorporates research, interpretation, and visualization of data in a way to make insights into business processes easier even for a user without special analytics training.\\\\In time when the amount of available data is enormous just using descriptive statistics in many cases may lead to useful conclusions about the processes and/or better understanding problem areas of business. Data Visualization software Tableau may be used in a classroom to make business students aware of a wider phenomenon of big data and provide them with a relatively easy tool to describe the data.\\\\As with any new software, the important task of educators is to find data sets and data problems which are easily understandable and manageable by students and still close to real life tasks. We will show that an Excel file "TopBabyNames"available from Teradata University Network is a valuable source for creating an engaging and useful teaching kit. The file "TopBabayNames" contains 5000 records with more than 5 million occurrences of most popular baby names used in over 100 years in USA. We will show that this file provides ample opportunities to introduce main features of Tableau and use many different advanced types of charts not easily available in Excel. The topic is of interest to students and they can easily form different research questions themselves to create their own stories in charts about the most popular names.

TEACHING THE LANGUAGE OF BUSINESS TO THE CLINICAL SIDE

Dr. Gary Hackbarth (Valdosta State University), Dr. Kelly Gamble (Valdosta State University)

Demystifying revenues and expenditures in healthcare organizations is offered as a prescriptive measure for managers to increase the adoption and implementation information system success in healthcare by teaching the language of business to the clinical side by using a simpler explanation of how an organization becomes and stays profitable. A simple diagram is offered as a more intuitive way to explain business costs and why each healthcare worker must understand the "why" of staying profitable. Anecdotal evidence suggests that healthcare professionals can be just as blind to business realities as other workers.

Technology-Based Instructional Supplements for Your Class - How are They Changing Instruction and Learning Outcomes?

Dr. Annie Stith Willis (Virginia Commonwealth University), Prof. Wilma Andrews (Virginia Commonwealth University), Dr. Robert Andrews (Virginia Commonwealth University)

In this session the presenters along with the audience will explore the use of technology-based supplements that are marketed as a tool to assist faculty with instruction and students with improved~learning outcomes.~~The goal of the discussion will be to share the experiences of the authors with the attending faculty; encourage participation by sharing experiences of those attending; discuss the value of these supplements; and talk about what supplements~can add to or detract from~the learning environment of a class. ~ Particular attention will be paid to currently available supplements that accompany the books faculty use and require the students to purchase. ~How the publishing company book representatives market the whole package of textbook and the supplemental products will be discussed as well. ~Book representatives may offer to package the many combinations at a reduced cost as part of the bargaining process~to adopt their products. ~To support using these supplements they provide statistics of improved student grades with the use of their supplements. ~Like any tool its effectiveness depends on the quality of the tool but also on how the tool is used. For the typical textbook adoption there are many things to consider in addition to the actual textbook itself. ~Many of the textbooks come with the options of choosing hard backed text, paperback text, loose leaf notebook style or electronic version of the text. ~Then for the textbook supplements it has become typical to have faculty lecture slides, student lecture slides, student solutions manual, homework on-line, lecture videos, computational software and possibly simulation software. ~Faculty have to decide what they will require for student purchase and what is optional for use at the student's discretion. This session will encourage audience members to join in this discussion by sharing their experiences with classroom supplements. ~Faculty can make better selections by learning from others about the things that have worked and the things that have failed to achieve the desired or expected results. ~The supplements session participants can learn of the best practices of others in the overall desire of most faculty to improve the delivery process of information in the classroom. ~Participants will also be able to share their students' reactions to the use of the technology-based supplements. ~

The Application of the Business Canvas for Private Independent School and its Use in Curriculum: PANEL DISCUSSION OF APPLICATION OF NEWER ENTREPRENEURSHIP TOOL

Dr. Janice Black (Coastal Carolina University), Dr. Leann Mischel (Coastal Carolina University), Dr. April Spivak (Coastal Carolina University)

Session Description: This panel session includes the lead entrepreneurial educator of the private school and the entrepreneurship faculty and discusses the process of creating the business canvas model for the private school start up. A comparison of the canvas model used by the CEO competition for students versus the foundation canvas is included. The pros and cons of using these model to teach entrepreneurial thinking to Freshmen and non-business students rounds out the panel topics.\\.\\Session Benefit to Members: The Business Canvas Model is an alternative for a full business plan that is used to present a short feasibility study of a potential start up. Entrepreneurship faculty have begun using this method in teaching entrepreneurship and the idea of “testing” ideas and tweaking results. This panel discussion represents faculty use of this method as a way to really learn the tool before teaching and where such methodology might be used in courses where the full business plan is not an appropriate tool.

The Digital Age: Advertising on Social Media and Its Effectiveness

Ms. Shayanna Bonner (Savannah State University)

The increasing usage of social media in today's society has led many advertising strategists to rethink how they present a company's products or services. In this research paper, the author introduces and proposes the benefits of advertising on social media and its influences on the viewer's psychology and purchasing decisions. The research discusses effective ways to advertise on social media and how to profit through advertising on social media. This study addresses the following research questions: \begin{itemize} \itemsep1pt\parskip0pt\parsep0pt \item What role does social media play in advertising? \item How can social media advertising create a decent return on investment (ROI)? \item What characteristics make advertisements effective on social media? \end{itemize} This research paper strives to present an effective social media advertising strategy and improve the way advertising is done. \emph{Key Words: Social Media, Psychology, Advertising, Consumer Attention}

THE DOORS ARE CLOSED BUT THE WINDOWS ARE OPENED: A REALISTIC PERSPECTIVE ON DATA SECURITY AND PRIVACY

Dr. Howard Hamilton (Florida Atlantic University)

\emph{Information and data security continue to receive their fair share of publicity. Users and owners of these expensive commodities have become more concerned about their confidentiality and privacy. There are even more troubling views that in this epoch, the probability of a business being hacked or an individual's personally identifiable information being leaked is very high. This paper puts into perspective the data security dilemma currently being faced by entities and how to secure data from obvious threats. It presents what is termed by this work as a realistic perspective on today and future security situations. This paper will also set the stage for further research to update the knowledge base on confidentiality and privacy with lifestyle behavioral patterns to data and information security.}

The Effect of Nonlinear Inventory Turnover Ratio on Inventory Management Efficiency

Dr. Daesung Ha (Marshall University)

This study examines the effect of nonlinear inventory turnover ratio on the inventory-performance relationship. The inventory turnover ratio is measured by the ratio between inventory and sales. The existing studies on the inventory –performance relationship assumed a linear relationship between inventory and sales: as firm's sales increases, the quantity of inventory should also increase proportionately. The assumption, however, conflicts with the optimal inventory policy based on the economic order quantity model. As such, the linear inventory turnover ratio fails to recognize the fundamental inventory cost tradeoffs and cannot be considered as a good indicator of efficiency in inventory management. Assuming inventory turnover ratios are nonlinear, a few recent studies examined the inventory-performance relationship and reported conflicting results with the existing studies. In this study, we examine the nonlinear relationship between inventory and sales at the firm-specific level, using the panel data of U.S. manufacturing firms over the period of 1980–2014 collected from the Compustat database. Our results show that neither of the assumptions was prevailed over the sample period.

The Effects of Anthropomorphic Advertising

Ms. Neychea Colvin (Savannah State University)

This research focuses on Anthropomorphism as it relates to consumer advertising. When using anthropomorphic advertising, it important for companies to know and understand how it will effect consumers and consumer purchasing habits. This research discusses how anthropomorphic advertisements appeal to consumers' emotions. This research will also discuss both the positive and negative effects of anthropomorphic advertising and how consumers perceive and receive anthropomorphic messages. Consumers may or may not trust anthropomorphic advertisements. These effects vary by age, culture, and product. This study addresses the following questions: \begin{itemize} \itemsep1pt\parskip0pt\parsep0pt \item What is anthropomorphism? \item How does anthropomorphic advertising appeal to consumers' emotions? \item Will anthropomorphic advertising have a positive or negative effect on consumers? Why? \item Do consumers trust anthropomorphic advertisements? Why or Why not? \item How does age, culture, and product differentiation effect anthropomorphic advertising appeals? \item How do companies use anthropomorphic appeals for Branding? \end{itemize} This research answers the questions above and spread knowledge and understanding about the effects of anthropomorphic advertising on consumers. \textbf{Keywords:} Anthropomorphism, Emotional Appeal, Positive effects, Negative effects, Trust, Branding

The Halo Effect: Celebrity Influence within Popular Culture

Mr. Howard Wilson (Savannah State University)

Popular culture is defined as the sum of thoughts, points of view, states of mind, pictures, and other wonders that are inside the standard of a given culture, particularly Western culture of the right on time to mid-twentieth century and the developing worldwide standard of the late twentieth and mid-21st century. The Halo Effect is the thing that influences a client or consumer to purchase that specific item when a big name is appended to the mindfulness stage. The research has also been broken down into 5 sections that will help support the research question posed above.~ These sections include celebrity influence, consumer attitudes, past and current trends of advertising, as well as pop culture and branding itself. This research will shed light on: \begin{itemize} \itemsep1pt\parskip0pt\parsep0pt \item Why consumers enable certain products and services to trend above others due to influences within pop-culture and even culture itself.~ \item How a consumer moderate a negative vs. a positive association with a celebrity in regards to brand endorsements? \item What impact does a high profile endorsement have on a business/ brand and is it powerful enough "revive" a dying business? \item In efforts to achieve high volume sales, how do brands determine what endorser to seek and can they gauge consumer approval?~ \end{itemize} The end result of this research is expected to show the dominance of popular culture's influence on the average consumer when making a purchasing decision. Keywords: Corporate Credibility, Popular Culture, Consumer Trends, Celebrity, Diversity, and Consumer Attitudes.

The impact of information management and relationship quality on healthcare industrial vending machine implementation and use: A preliminary empirical analysis

Dr. Mauro Falasca (East Carolina University), Dr. John Kros (East Carolina University), Dr. Jon Kirchoff (East Carolina University)

Healthcare organizations face considerable pressure and challenges in efficiently and effectively managing their supply chain operations. Although slow to change, the healthcare industry has begun to consider alternative inventory management systems in order to improve inventory control and patient care. Industrial vending machines (IVM) represent a specific form of vendor-managed inventory (VMI) that can help healthcare organizations address different inventory management issues. The purpose of this research is to develop and test a model that highlights the critical role of information management in the link between relationship quality and different outcomes of IVM implementation and use in the healthcare sector. A theoretical model is proposed to explore the relationship between information management, relationship quality and different healthcare IVM benefits. Structural equation modeling and survey data from over 100 healthcare supply chain managers are used to test the research hypotheses. Empirically tested results grounded in TCE and contingency theory confirm the relationships between different healthcare IVM enablers and outcomes. More specifically, findings suggest that the successful implementation and use of IVM is tied to both information management as well as the quality of the relationship between vendors and healthcare organizations. Results also indicate that the information that is shared between healthcare supply chain partners mediates the relationship between relationship quality and various healthcare cost, service and inventory benefits. The findings presented in this study provide healthcare supply chain managers with current findings, which should aid them in evaluating IVM solutions.

The Integrated Disaster Medical Assistance Team Scheduling and Relief Supply Distribution Problem

Dr. Shengbin Wang (North Carolina A & T State University)

In this paper, we study a post-disaster humanitarian logistic problem in which several disaster medical assistance teams or mobile clinics are dispatched to provide medical services to beneficiaries in affected areas. Such services often require a certain number of relief supplies that are sourced from various government- and non-government-operated distribution centers. In emergencies, there is not enough time for these assistance teams or mobile clinics to carry sufficient medical supplies such as medicine, vaccines, gauze pads, and syringe needles with them, and therefore the teams are not able to conduct on-site medical services until the arrival of medical supplies. This paper extends the work of Lei et al. published in Annals of Operations Research, 2015, Volume 235, Issue 1, in which the authors assumed that the medical teams could visit another location after completing services at one demand point, but that "the teams' routes are pre-determined or fixed". In this paper, however, the traveling routes of assistance teams are not given as inputs, and alternatively they must be determined along with the distribution of relief supplies. Hence, our problem contains a time dependent vehicle routing problem as its sub-problem, making it more complicated. A mixed integer-programming model is first developed to address the issues of equity, efficacy, and efficiency in humanitarian logistics. Then, a two-stage hybrid metaheuristic method is proposed to solve the problem. In the first stage, medical assistance team routes are generated using the Artificial Bee Colony (ABC) algorithm. The fitness function values for feasible solutions are determined through Linear Programming (LP) Relaxation. After the routes are fixed, a Rolling Horizon (RH) approach designed in Lei et al. (2015) is applied to solve the resulting problem. Two other less complex variants of the ABC algorithms in the first stage are also proposed for comparison purposes. Problem instances of various sizes as well as a case study based on the 2016 Kyushu Earthquake in Japan are generated to test our proposed algorithm. Computational results show that the hybrid metaheuristic algorithm is able to find near-optimal solutions in minutes. The performance of the algorithm is also demonstrated to be efficient, especially in emergency situations where quick response is highly desirable.

THE RESEARCH AND EXPERIMENTAL TAX CREDIT LAW GIVES BUSINESSES A COMPETITIVE WEAPON

Dr. James Alford (The Citadel)

Firms can enhance their profitability by acting upon the Research and Experimental Tax Credits provisions of IRS Code Section 41, which became permanent in 2015. The law had been extended year by year since 1986. The carry-back and carry-forward provisions allow firms to go back three years to take advantage of credits if they have not previously done so. Previous research has identified six distinctive competencies as leading to competitive advantage. Five of these are impacted by the information presented here. \\Use of the tax law provisions is important to business owners, managers, consultants, and academicians. Organizations should incorporate these provisions into their strategic management and planning processes. Consultants should make their clients aware of the provisions of the law. Additionally, the features discussed provide points of departure for research and teaching by academicians. An example of how a firm might take advantage of the Research and Experimental Tax Credit is provided.

The Role of Colleges and Universities in Students' Financial Well-Being

Dr. Michelle Hagadorn (Roanok)

Full paper attached

The Role Of Culture And Gender-Based Differences In The Attitudes Toward Women As Managers

Dr. Cody Logan Chullen (East Carolina University), Dr. Tope Bello (East Carolina University)

A number of studies have examined the attitudes toward women managers across different nations. The near consensus result is that negative attitude toward women managers persist across the globe. Women in general, regardless of culture, tend to have more positive attitude toward women managers than their male counterparts. This paper examines these studies with the intent of highlighting the variables that may be better predictors of attitudes toward women as managers in multiple national contexts. There are indications that certain cultural factors and gender-based perceptual differences can be used to predict the level of acceptance that females may encounter in upper managerial ranks.

The Role of Lobbying Intensity, PAC Formation and Political Connections on Financial Performance in the Oil and Gas Industry

Dr. Richard Brown (Pennsylvania State University)

In this paper, I test the relationship between corporate political activities (PACs, Lobbying and Connections) on subsequent financial performance of firms in the oil and gas industry from 1998 to 2008. I find that all three types of political activities are positively associated with subsequent firm-level performance, as measured by Earnings Before Interest and Taxes (EBIT). The findings add to the small, yet robust, argument of rent-seeking as a theoretical underpinning for corporate political activity.

The Transforming Power of Undergraduate Research: An Observation

Dr. Derald Wentzien (Wesley College), Ms. Kasey Thompson (Woodbridge Middle School)

Many colleges and universities have adopted and incorporated undergraduate research into their programs. The students who perform undergraduate research gain valuable experiences working through the research process and the colleges and universities who offer undergraduate research get to promote the opportunities to prospective students. ~In this paper, an undergraduate research project performed by a student is discussed. The results of the study and impact of the research are presented.~ The positive impacts of the research far exceeded those established at the beginning of the study. ~Although the results are presented for a particular study, the observations undoubtedly apply to many other undergraduate research projects performed at many other colleges and university.~ The purpose of the paper is to discuss a typical undergraduate research project and present the observed higher-level impact of the undergraduate research project since the full benefits may not be readily apparent at the start of any project.~

TRACKING THE S\&P 500: SOME SUMMARIES AND STOCHASTIC VERSUS DETERMINISTIC TRENDS

Dr. Barry Pfitzner (Randolph-Macon College)

This investigation provides decade-by-decade “rate of return” statistics on a common index for stocks. Four variations of the S\&P 500 are considered: the S\&P 500 index, the S\&P 500 with reinvested dividends, and each of those indexes adjusted for inflation as measured by the Consumer Price Index. Also included is a comparison of deterministic versus stochastic trends fitted to monthly data. Selected forecast profiles are provided as well. The paper documents very different returns by decade, including the current (unfinished) decade’s strong performance.

U.S. Based Lobbying Efforts and the Liability of Foreignness

Dr. william kline (Pennsylvania State University), Dr. Richard Brown (Pennsylvania State University)

The liability of foreignness (LOF) is a well-established concept that captures the disadvantages experienced by foreign-based firms as they compete with local firms (Zaheer, 1995). Expenses stemming from the LOF vary by industry and consist of additional expenses associated with things such as less developed infrastructure, less know-how, or physical distance. This study examines if foreign firms attempt to overcome the liability of foreignness by developing non-market organizational capabilities, specifically, corporate political capabilities. \\\\We focus on lobbying expenditures by approximately 180 franchising firms over the five-year period from 2009 to 2013 (capturing approximately 880 firm-year observations). Franchising firms provide a particularly meaningful backdrop for LOF studies because of the fairly simple business models they utilize. Franchising firms generally utilize a horizontal multinational enterprise (MNE) model, where units offer homogeneous products or services in different markets (Caves, 1982). The LOF should be relevant because MNE units compete directly with local firms. Theoretically the LOF is less acute in contexts where vertical operations (value-add systems) are typical (Ghoshal and Nohria, 1989).\\\\In this study we posit that foreign-owned franchisors spend on lobbying activities in an effort to overcome the liability of foreignness. We find support for this hypothesis. We then test the relationship between the percentage of U.S. subunits and lobbying efforts, arguing that the percentage of U.S. units will be positively related to lobbying expenditures. However, we find a negative relationship. Finally, we test the interaction between the percentage of U.S. units and foreignness and find insignificant results. These findings help to fill an important research gap in the LOF and corporate political activities literature.

UNDERSTANDING THE IMPACT OF PERCEIVED COMMUNITY IMPACT AND MEDIA INTEREST ON ENVIRONMENTAL SPILL REPORTING

Dr. Gary Hackbarth (Valdosta State University), Dr. Marko Horn (Valdosta State University)

The National Response Center (NRC) data base offers a unique insight into the intentions of companies when the report Oil Spills and Hazardous Material Releases. Given that most firms routinely advertise and state their concern for the environment, when the opportunity occurs to report the impact or interest to the community, it is not done. Less than 1\% of the reports from 1990 to 2015 anticipate community or media interest for an incident yet, they spend twice as long, 13 versus 7 minutes, reporting the incident. This suggests that there is something they are concerned about and they either wish to disclose more information in anticipation of increased scrutiny, or to protect the organization by being more transparent than they ordinary are. Several reasons for this phenomenon are possible and need to be researched in more depth, but it is likely that the individual making the report wishes to be more forthcoming in the report to protect themselves should the media or community become involved.

Unintended Consequences of Corporate Average Fuel Efficiency (CAFE) Standards

Mr. Tyler Hogan (Presbyterian College)

Abstract: One of the ways legislators in the United States try to lower\\greenhouse gas emissions, oil consumption, dependence of foreign oil, and\\gain a multitude of other benefits is by applying corporate average fuel\\efficiency (CAFE) standards to automakers. CAFE standards are laws that\\mandate automakers have to produce vehicles that are able to achieve a set\\average fuel efficiency. ~This research project gives examples of how\\manufacturers mined for legislative loopholes from around 1990 through the\\early 2000's and shows many of the unintended consequences of this\\legislation. ~Some manufacturers moved final vehicle assembly to another\\country, reclassified a passenger car as a light truck by changing the\\vehicle base, built more SUVs which were not classified as cars and not\\subject to gas guzzler taxes, added flex-fuel vehicles that could also run\\partially on gas mixed with ethanol, and added weight to a vehicle to\\change its classification. ~The paper examines added costs to consumers\\and suggests market-based alternatives to these standards.

USING REAL DATA TO ENHANCE LEARNING IN AN ACCOUNTING INFORMATION SYSTEMS COURSE

Mrs. Karen Mattison (Presbyterian College)

Textbooks provide students with clear problems with specific correct and incorrect answers that often round to even numbers. Data in the real-world is not that pretty. Students need to learn to take raw data, organize it, and draw conclusions from it. According to the American Institute of Certified Public Accountants, critical thinking skills are important and will be tested more on the new Certified Public Accountants examination. Students need to be able to think critically and analyze data. \\\\Over the last three years, I have partnered with non-profits to receive multi-year financial or quantitative data in Excel. In two cases, copies of financial statements and tax returns were also received. The projects began with the non-profit organization leader introducing their organization and its mission to the students. Some organization leaders suggested questions they would like answered from the data analysis. Students sign a confidentiality agreement and then begin working with the data. In groups, students determine how they will analyze the data. Project goals were broad allowing the students to determine how they would analyze the data and what key points they wanted to make.\\\\Excel pivot tables and VLOOKUP skills were reviewed. Guidelines for formal business reports and presentations were provided. Students used these and other resources to organize the data. Students consulted other sources for related information when needed. In each case the students prepared a final written report and in two of the cases, the information was formally presented to the organization. \\\\Students enjoyed providing helpful information to the organizations. Students also felt they had improved their Excel skills especially with Pivot tables. Students did not like that the information was unorganized or in varied formats. Students were frustrated by required rewrites of the paper to ensure it professional quality. Overall, both the students and the organizations found the projects to be useful.

VALUE CREATION THROUGH EFFECTIVE DEMAND-DRIVEN SUPPLY CHAIN MANAGEMENT: EMPIRICAL EVIDENCE FROM LONG-RUN STOCK PERFORMANCE

Dr. Xun Li (Nicholls State University), Dr. Qun Wu (University of Nevada), Dr. J Field (Nicholls State University)

Demand-driven supply chain management (DDSCM) has become a strategic weapon to create value for firms. However, the existing literature provides limited empirical support on the value creation of effective DDSCM. Building on the existing literature and the theory of dynamic capabilities, we hypothesize that DDSCM can create significant market value for shareholders. We use AMR's "Supply Chain Top 25" ranking to obtain a sample of firms independently identified as top performing DDSCM firms, and examine their long-run stock performance. The results show that investing in the portfolio of top DDSCM firms can generate significantly positive abnormal returns after controlling for a variety of factors to discount alternative explanations. To provide further evidence regarding the practical application of our findings, we investigate buy-and-sell abnormal returns and show that investors can earn significantly positive abnormal returns by simultaneously buying a portfolio of top DDSCM firms and selling a portfolio of matching firms.

Vertical Pressure as a Mechanism to Combat Monopolistic Bargaining Power: The Case of Pearl Jam Versus Ticketmaster

Dr. Richard Brown (Pennsylvania State University)

The theory of relative bargaining power (RBP) predicts that, in a dyadical transaction, value will be captured by the actor with more or better marginal outside options. As such, Industrial Organization (IO) Theory posits that monopolists should prevail against bargaining partners since these bargaining partners have no outside options. While this may be generally true, specific vertical bargaining partners may have unique abilities to diminish monopoly rents if they can establish a countervailing power that is equal to, yet different from, the monopolist. These abilities can range from the partners own status as a dominant player in its industry to the ability to apply social pressures onto the bargaining partner in an attempt to diminish value extraction. While there is literature in the IO field that addresses both horizontal power and vertical power, there is a dearth of theory and empirics about such countervailing measures.\\ This paper addresses the lack of industrial organization-based research in the management field by theoretically modeling, and then qualitatively studying, the ways whereby vertical bargaining partners may be effective in combating monopoly power. I do this through a case study method since these relationships are difficult to study quantitatively. The case study revolves around the business, legal and public relations battle between Pearl Jam, a rock band who was one of the biggest forces in media in 1994, and Ticketmaster, a powerful broker/distributor of tickets and venues in the entertainment industry. While Ticketmaster had monopoly power and, therefore, vertical bargaining power over their supply chain (i.e. entertainment acts), Pearl Jam had “celebrity power,” a burgeoning field of study in management, marketing and sociology. \\Using archival sources such as lawsuits, Congressional hearings, media interviews and business press, this case study studies how these two parties used their specific power capabilities during the time period of 1992 through 1997.

What a Time-Series Model Implies about Trading Strategies

Dr. Joshua Brooks (Lander University Greenwood South Carolina), Dr. Lili Chen (Lander University)

The purpose of this paper is to put forward basic trading strategies that are the product of econometric modelling. We develop two basic divisions of these trading strategies: first order and higher order. First-order trading strategies are applicable for situations where simply going long or short is a probabilistically advantageous response to a given financial instrument's data generating process. Higher-order trading strategies move beyond trading short and long with market orders. This paper adds to the body of work that connects trading strategies to econometric modelling.

Who can you trust? Identifying signals of trust in supply chain relationships

Mr. Ryan Kentrus (University of Maryland University College)

Trust between organizations is a necessary component for supply chains to function effectively. The nature of trust allows a party within a relationship to put themselves in a vulnerable state where they expect positive outcomes or intentions and behaviors from the other party.~ Supply chain management can be a source of competitive advantage for organizations. Signaling involves the exchange of information, and trust is a signal that organizations can look for to determine if a supply chain management relationship is worthwhile, leading to a stronger competitive advantage.~ As supply chain management is a source of competitive advantage, managers need to be able to recognize signals of trust in a supply chain environment. Recognizing these signals of trust will help create stronger supply chain relationships and thus a stronger competitive advantage for the organizations that can trust each other as supply chain partners.~ Research was conducted to determine what the signals of trust are in supply chain relationships between organizations.~ This research was utilized to see which signals management should seek to know that they can trust a supplier in their supply chain.~ Knowledge sharing, relationship commitment, effective communication, planning and collaboration, and engage in well-reasoned risk were cited as signals of trust in supply chain relationships. ~

WITHER SOFTWARE? ARE SOFTWARE ONLY COMPANIES VIABLE?

Dr. Patrick Olson (National University), Dr. Donna Schaeffer (Marymount University)

Regardless of one's opinion of the "Surface"one should be acknowledge some attributes of the advertising that Microsoft is deploying. For example, these ads are very broadly distributed. Additionally, they have a nearly strident tone in their comparisons to Apple's products. However, an important aspect of this advertising is likely missed by most people. That is, even though the capabilities of the "Surface"are often the result of software, it is a device – and therefore, hardware.\\ The reason that one should take notice of the fact that the "Surface"is a device is because Microsoft may have been the only viable "general software"company in history. Until recently it did not sell hardware products or devices. While the company never embraced a broad availability of their software products across platforms (which is likely due to the fact that they were competing with these platforms), it was the largest and most successful company that provided software only.\\ This is important for two reasons. The first of these is the impact on the longstanding discussions of how to "monetize"technology. In effect, what if "software", while important, can no longer be "monetized", at least in the way Microsoft had succeeded. This raises further questions about how technology markets have changed, and about the nature of software? The second reason this is important is the very simple question of how do we think about software. While it is obvious it is not a set of features for hardware, what is it? Once again further issues are raised. For example, how should software be supported in product development, and how should it be treated when providing education and training? \\ For this paper a simple taxonomy of technology companies will be examined. The companies considered will be derived from Fortune, Forbes and NASDAQ. The first step will be a simple classification on a 2X2 matrix with software on one access and hardware on the other access. For companies that are largely software companies a further taxonomy will be prepared based on the kind or kinds of software that provide their revenues. \\ The outcome will be a demonstration of if either "software only"or "hardware only"products are succeeding in the marketplace. Additionally, an initial indication of how software and hardware are combined in current markets will result. The importance of this is to begin the examination of the viability of "software only" companies, and many of the issues that follow from that question. This paper is meant to be a beginning.

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Program Chair:
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