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Section I

Abstracts
Student Interest in Online Courses at a Liberal Arts University

John St.Clair, Ed. D.
Director of Blended and Distance Learning
University of Mary Washington
Fredericksburg, VA 22406
jstclair@umw.edu

ABSTRACT

Recent research, such as the Allen & Seaman studies sponsored by the Sloan Consortium, shows significant numbers of online and blended courses in use at universities in the United States. For profit institutions of higher learning are also offering increasing numbers of online courses, programs, and degrees. However, many public and private colleges and universities have chosen to refrain from making online courses a major part of their offerings.

A review of spring 2011 course offerings at the twenty-six COPLAC (Council of Public Liberal Arts Colleges) institutions finds only six institutions offering more than twenty class sections in an online format. Why are the other twenty schools declining to offer courses online? Anecdotal evidence includes the sentiment that smaller liberal arts colleges and universities attract students wanting a close academic relationship with faculty. Some feel that online courses do not offer the same social and interpersonal opportunities that may be found in traditional face-to-face classes.

To examine the actual interest in participating in online courses by students at a small liberal arts university, the students at the University of Mary Washington (UMW) were surveyed during fall 2010. UMW is a primarily undergraduate, residential liberal arts university with approximately 4,000 undergraduate students. There are also approximately 1,000 graduate students in education and business. Over 500 responses were analyzed to determine interest level and patterns of interest by class level, type of delivery format, residence status, and commute time to campus.
E-Learning is a Subset of E-Commerce

Parwaiz Karamat
Open Polytechnic of New Zealand,
Wellington, New Zealand
Parwaiz.karamat@openpolytechnic.ac.net

Harsha Wijesinghe
University of Otago
Dunedin, New Zealand
Harsha.wijesinghe@gmail.com

ABSTRACT
E-learning has emerged as an effective and efficient business industry with significant gains through collaboration of skills and knowledge between stakeholders. If e-learning is not adopted as a business, then there is no difference between e-learning and the previously used ICT enable learning solutions. The particular focus of this study was to examine if e-learning is a real subset of e-commerce. For this purpose, a review of the literature was made which demonstrated that among the e-commerce businesses; e-learning nowadays is one of the most profitable e-businesses.
Co-Creation Methodologies in a Strong Matrix Organization: 
A Hermeneutic Approach

Mukesh Srivastava, DBA 
College of Business 
University of Mary Washington 
Fredericksburg, VA 22406 
msrivast@umw.edu

ABSTRACT

This paper examines employing co-creation methodologies in a strong matrix organization in the context of knowledge sharing via sense-giving and sense-reading as well as through the use of boundary objects. A case study was conducted following a qualitative hermeneutic approach. Undertaken research followed previous research from Barrett and Oborn based on Polyani’s sense-making theory as well as the use of boundary objects based off research by Star and Griesemer. Case analysis demonstrates that the customers and vendors wanted a contract as a formal boundary object to create the framework bridging the various groups together in a co-creation effort. As an informal boundary object, customers and vendors supported the use of Web 2.0 technologies to engage in knowledge sharing amongst groups that are geographically located in separate locations. The Web 2.0 tools can enable co-creation by enabling immediate knowledge sharing between customers and vendors as well as between the vendor developer groups. The use of a technical integrator to act as a boundary spanner was met positively by management and negatively or neutrally by vendor developers. Sense-giving and sense-reading is impaired through one program’s use of on-site contractors in an advisory role, which could have a severe impact on a co-creation effort between the two programs. The exchange of knowledge and information is hampered by the on-site contractors that act as a barrier to knowledge sharing primarily due to miscommunication.
Values as Determinants of Motivation to Lead

Alton B. Clemmons III, PhD
PSC 2 Box 11312
APO AE 09012
011-491-6371-4056961
al.clemmons@yahoo.com

Dail Fields, PhD
Regent University
School of Global Leadership and Entrepreneurship
1000 Regent University Drive
Virginia Beach, VA 23464-9800
dailfie@regent.edu

ABSTRACT

This study examined the incremental contribution of personal values in determining three forms of MTL within a sample of military personnel. The study investigated values as predictors of affective-identity MTL, social-normative MTL, and non-calculative MTL. The personal values investigated were spirituality, integrity, and willingness to serve, which operationalized self-transcendence value orientation as defined by the Schwartz Value Theory, and desire for power and achievement, which operationalized self-enhancement value orientation. In multivariate analyses which controlled for individual characteristics found previously to predict the three forms of MTL, we found that personal values made significant incremental contribution to the explanation of the three forms of MTL. Values had the largest incremental effect in explaining non-calculative MTL. Desire for power and achievement had a larger positive relationship with affective-identity MTL than did spirituality, integrity, and willingness to serve. Surprisingly, desire for power and achievement also had a larger positive relationship with social normative MTL than did the self-transcendence values and self-transcendence values had a significantly larger relationship with non-calculative MTL than did desire for power and achievement.
The Relationship Between Learning Orientation and Business Performance and the Moderating Effect of Competitive Advantage in Service Organizations

Louis A. Martinette
College of Graduate and Professional Studies
University of Mary Washington
Fredericksburg, VA 22408
docmartinette@mac.com

Alice Obenchain-Leeson
Averett University
Danville VA 24541
aliceo@averette.edu

ABSTRACT

The proposed study examines the influence of learning orientation on business performance (the achievement of sales and profit objectives) in the context of service organizations. Gronroos (2000) explains that services have shared characteristics, which include: simultaneous production and consumption and participation by the customer in the service production process. Further, Gronroos (2008) suggests that both producers of services and their customers share in the value creation process. The shared nature of this value creation process suggests that service organizations may have strong capabilities toward organizational learning. The conceptual framework used in this research has been drawn from marketing, finance, and organizational behavior theory. Specifically, relationships related to learning orientation, sources of competitive advantage and business performance have been identified. This research develops the theories of learning orientation (the core theory of this paper), competitive advantage, and identifies key business performance measures to examine some research questions – Among service organizations, is there a relationship between learning orientation and business performance—the achievement of sales and profit? Is there a relationship between learning orientation and business performance in service organizations? Does competitive advantage moderate the relationship between learning orientation and business performance in service organizations? A survey based research methodology is used to explore these research questions and pertinent findings reported in the light of previous study (Martinette, 2006, Martinette & Obenchain-Leeson, 2010).
The Impact of Sarbanes-Oxley on Nonprofit Governance Practices

Patrice Luoma, Ph. D.
275 Mount Carmel Avenue
Quinnipiac University
Hamden, CT 06518
Luoma@quinnipiac.edu

ABSTRACT

Corporate governance has come under intense scrutiny in the early years of the twenty-first century due to scandals, such as those which took place at Enron and WorldCom. The boards of these companies were criticized for failing in their fiduciary duty, thus allowing managers of these companies to engage in unethical and illegal activities.

While the significant media hype has centered on just a few corporations, it must be noted that this ethical and legal misconduct goes far beyond and has not been limited to the for-profit sector. Incidents at the US Olympic Committee, the New York Stock Exchange, and the United Way (Jacobs, 2004) have heightened concern for governance in the nonprofit sector as well.

There is a developing body of knowledge comprised of best practices for governance in nonprofit organizations. While these best practices are not a guarantee of board or organizational effectiveness, they are generally accepted as principles of good governance and may serve to benefit all organizations. According to Herman & Renz (2004) “best practices can be regarded as legitimating techniques and, therefore, as a moving target. Given the great difficulty of assessing nonprofit organizational effectiveness, funders and others feel the need for some indicators of effective management...Nonprofit organizations that keep up with this set are likely to be regarded as effective, thereby increasing their legitimacy and their chances of securing funding...” (703).

This study surveyed nonprofit executives to determine their awareness and adoption of for-profit governance regulation and practices in the nonprofit sector. Specifically, the study sought to determine the executives’ awareness of Sarbanes-Oxley and whether they had made any changes in their boards or organizations due to their awareness of Sarbanes-Oxley. In addition, the study sought to determine how such awareness and adoption of governance practices might develop in the nonprofit organization.
Stakeholder Dialogue as a CSR Decision-Making Strategy: A Qualitative Case Study of Sugar Processing Conglomerate and Sugar Cane Farmers in Thailand

Suwichit (Sean) Chaidaroon, Ph.D.
Division of Public and Promotional Communication
Wee Kim Wee School of Communication and Information
Nanyang Technological University
31 Nanyang Link, WKWSCI Building
Singapore 637718
schaidaroon@ntu.edu.sg

ABSTRACT

This paper reports a qualitative case study of a sugar processing conglomerate and sugar cane farmers in Northeastern Thailand to illustrate the challenges that prevent them from engaging in a genuine dialogue with each other. Group discussions with managers and in-depth interviews with sugar cane farmers were conducted. Preliminary data analysis suggests that the company and farmers experienced dialectical challenges in communicating with each other. While both parties hoped to do something “good” for the community and maintain business success at the same time, they struggled to put this ideology into practice. This paper hopes to highlight that negotiating this somewhat opposing ideology and practice would lead to a genuine stakeholder dialogue, which is an essential process in CSR decision-making for an organization.
Project Management - Contemporary Issues – Contemporary Answers – Generation Y.

Diane Dromgold
RNC Global Projects
Level 21/201 Miller Street
North Sydney 2060
Australia
ddromgold@rncglobal.com

ABSTRACT

Generations Y and Z present intriguing challenges for projects.

Today, people are shared between and across projects and business as usual. People work on several projects at the same time meaning project managers must compete for the attention and ‘effort share’ of each individual.

Project managers, are uniquely placed to leverage this and thereby facilitate project success. Generations Y and Z demand they be the centre of the plan – not the task.

This paper explains an approach, developed and tested through trial, error, thought and research that works for and with Generations Y and Z (and Boomers and X’ers thrive under it as well).
Balanced Scorecard and Determining the Relation of Strategic Goals and Performance Measures: Evidence, Semnan Province Tax Organizations of Iran

Mehdi Zaribaf  
Islamic Azad University  
Firoozkuh Branch  
Iran  
mzrbf1@gmail.com

Baran Samandi  
Islamic Azad University  
Firoozkuh Branch  
Iran

ABSTRACT

Nowadays, organizations have been affected by competition and rapidly growth than other times, so they have realized the role of strategic management and the need for successful implementing and measuring of strategies. Supplying a system, that not only could measure their performances, but also control and implement strategies, is in fact considered as a blooming period in developing strategic management knowledge, and was highly embraced by managers. Balanced scorecards have provided this by using non-financial performance measures in customer, internal process, and learning and growth perspectives together in balance with financial measures, and establishing cause and effect relationships, concerning organization's strategic objectives.

The present research aims to provide a BSC model in which all key performance activities, strategic objectives and evaluating measures of Semnan Tax Organizations defined in the framework of four perspectives of BSC model based on major strategies of Iran Tax Organization. Archival and field study tools have been used in this research. For identifying measures, tax experts and chief executive's viewpoints have been used in this research. For identifying measures, tax experts and chief executive's viewpoints have been gathered, and for collecting data, documents and records of Semnan Tax Offices and statistics available in Semnan Province, have been used at a period of 5 years (2004-2008). Through applying analysis of correlation, we have identified the relationships between variables (measures) and drew first strategy map. Then, for finding any other probable relationships not shown in previous stage, we used regression analysis method, which has led to draw the final strategy map.
Organizational Change & Technology Acceptance In Higher Education: Validating The Technology Acceptance Model

Harold Lundy, Ph.D. Student
Alisa L. Mosley, Ph.D.
Baruch Lundy, Ph.D. Student,
Jackson State University,
Jackson, MS
hlundy@gmail.com

ABSTRACT

Technology was identified by Hannan & Freeman (1984) as one of four core structural changes that might cause organizational failures. Organizations that drastically change core technologies also alter other important organizational protocols and processes. By following the work of Gibson, Harris, and Colaric (2008), this study hopes to use the acceptance of online educational tools as a proxy for technology acceptance and core organizational change in higher education. Hannan & Freeman (1984) also argued that larger organizations would be less likely to change due to the bureaucratic structure that typically accompanies or a larger size.
Determining Guardian/Patient Bonding to a Capitated Pediatric Clinic- A General Mathematical Model for Primary Care Physicians: The Value of their Patient Census

Konrad E. Sadek
Eaton Canyon Pediatric Group, Special Projects
514 Tocino Dr.
Duarte, CA 91010
konradesadek@yahoo.com

ABSTRACT

Working under a capitated environment, for a clinic, makes only financial sense when taking a long-range outlook. A Pediatric clinic has an additional limitation, the years a child can come to a clinic are at maximum 18 years. Bonding of a parent and child to a clinic is crucial. A model has been developed that will show how strong the bonding is and if changes should be implemented.
Organizational Trust, Monitoring, Effort and Performance: An Investigation of Construct Relationships using Mixed Methods Design in Virtual Teams

Christina B. Steele
Colorado Technical University
2221 Cooper Trail
Canon City, CO 81212
steele.christina@ymail.com

ABSTRACT

Applying Creswell (2009), Edmondson & McManus (2007), Creswell & Plano Clark (2011) and Martins, et al. (2004) this paper offers a mixed methods approach to study how trust affects virtual teambuilding outcomes. Specifically, this paper examines the need for an explanatory sequential study in this area, which may be addressed by a quantitative analysis and qualitative exploratory study of trust and group outcomes in long-term Virtual Teams (VTs).
ABSTRACT

This paper addresses several factors necessary to create and manage highly effective cross-functional project teams (CFTs) in new product development (NPD). Specifically, the paper examines the need for and the emergence of CFTs; their potential benefits in new product development projects; the major challenges CFTs face; major project success drivers; a framework for planning projects, and the impact CFTs have on individuals, functional managers, and senior managers. Several recommendations for project leaders and those who manage them are made throughout the paper. Several suggestions for future research are made as well as implications for theory development.
Interactive Responsibility Among Organizations and Environments

David A. Hancock, D.M.
Cambium Break Consulting
1009 Queens Pl., Spring Hill TN 37174
drdavehancock@yahoo.com

Morton Cotlar, PhD, P.E.
University of Hawaii
1039 Kaalula Pl., Honolulu HI 96825
morton@hawaii.edu

ABSTRACT

This paper describes a new model that can clarify relationships between organizations and their environments. It explains how organizations interact with environments and identifies eight environmental segments. These segments of the entire environment interact with each other, aggravating complexity of the whole that organizations face. Cited is the process of how original authorization from society creates organizational responsibilities (with accountabilities) and how their fulfillment can lead to organizational success in its society. Finally, the paper shows how this complex process is not unlike that of other living systems existing in a society, promoting a new understanding of organizations.

This model inevitably leads to deeper understanding of organizations than classical organization behavior has provided. Societies may regard their organizations as susceptible to controls from some environmental segments, but often fail to recognize, in turn, the organizations’ responsibility to the complex environment of the society. People in such societies should understand the intricacy of interactions between organizations and their environments, particularly across today’s global milieu. Decision-makers in organizations need deep understanding of why their personal career success depends substantially on adequate fulfillment of their organizations’ responsibilities.

A conclusion implies substantial improvement in organizational operations is possible, if decision makers gain thorough understanding of environmental complexity. Organizational productivity can improve from recognizing that organizations can be regarded as a field of living systems theory; this and attitudinal changes from training offers research opportunities to assess benefits from proposed mind-set changes. A basis for acknowledging greater responsibility of organizations to their environments is critically needed globally.

Key Words: organizations, environments, behavior, living systems, responsibility, accountability, interactions
The Impact of Communication Technology Usage on Perceptions of Dominance Asymmetry in Groups: Consequences on Group Cohesion and Member Satisfaction

Daniel Tomiuk
Département de management et technologie
École des sciences de la gestion
Montréal (Québec) H2X 3X2
tomiuk.daniel@uqam.ca

Renard Laurent
Département de management et technologie
École des sciences de la gestion
Montréal (Québec) H2X 3X2
renard.laurent@uqam.ca

Wen Guang Qu
Département de management et technologie
École des sciences de la gestion
Montréal (Québec) H2X 3X2
wenguang.qu@mail.mcgill.ca

ABSTRACT:

At the end of a 13-week field experiment (student group projects in one of the author’s bachelor courses), participants were asked to fill out an online questionnaire as to their usage of communication technology throughout the semester and their perceptions of dominance within their groups. Based on Walther’s (1996) Hyperpersonal Model and on research in the area of Social Psychology, we initially hypothesized that dominance perceptions would be more extreme when group members used more information technology to communicate with one another. Also, members of groups which used less technology (more face-to-face meetings) would show greater symmetry in terms of dominance perceptions between self and their partners when compared to members of groups relying more strongly on technology to communicate. These more symmetrical perceptions of dominance would likely be more greatly associated with perception of group cohesion and satisfaction with the group. We present preliminary results of this study based on the responses of 106 students.
A Primer in Information Technology Sustainable Development

Joe T Roberts
Marlene V Wilcox, Ph. D.
Claremont Graduate University

William E Wilcox, Ph. D.
University of Northern Colorado
marlene.wilcox@cgu.edu

ABSTRACT

Sustainable development has garnered much recent attention in the business world and information technology industry. A review of existing studies and a close look at the potential benefits and pitfalls of sustainability allow for a better understanding of the growth and value of “green IT.” Key players in the industry also provide examples on how sustainability has been impacting individual organizations. This paper also provides strategies for addressing sustainable development in IT, an overview of what to expect in this area for the near future as well as suggestions for future research.

Keywords: information technology sustainable development, IT sustainable development, green computing, green IT
Understanding Interpersonal Dynamics in Project Team Management: A Managerial & Theoretical Perspective

David Wilemon, PhD
Emeritus Professor of Innovation Management
Whitman School of Management
Syracuse University
dwilemon@syr.edu

ABSTRACT

In the last two decades important gains have been made in our knowledge of project management. Much of this knowledge has focused on creating better tools to plan, execute, and control projects. There are, however, other important determinants of project success. Three areas which have received far less attention are how project leaders can gain support for their projects via their interpersonal power & influence; how to deal with those who can either block or help facilitate project accomplishment; and how to “manage upwards,” e.g., managing key relationships with project sponsors and senior management. This paper presents an integrated view of the challenges project managers face in dealing with these issues.

Keywords: Project leadership, project management politics, team leadership, senior management relationships, project teams
A Queuing Theory Based Model to Estimate the Variability of Waiting Time in Supply Chain Operations

Xiaofeng Zhao, Ph. D.
College of Business
University of Mary Washington,
Fredericksburg, VA 22401
xzhao@umw.edu

ABSTRACT

This paper explores the variability and measurement of waiting time in supply chain operations. In supply chain systems, many important quantities are variable. Because of the prevalence of variability and its disruptive influence on system performance, understanding it is critical to effective supply chain management. We provide a mathematically tractable exact expression for variance (as measured by coefficient of variation) of waiting time for $M/M/1$ queues. We apply this expression to give a two-moment approximation to the standard deviation of waiting time in $GI/G/1$ queue. The measurement requires only the mean and standard deviation or the coefficient of variation of the inter-arrival and service time distributions. It is simple enough to be implemented in manual or spreadsheet calculations, but in comparisons to Monte Carlo simulations has proven to give good approximations (within $\pm 10\%$), under the assumption that the coefficients of variation for the inter-arrival and service times are between 0 and 1.25.
Automated Metadata for Image Mining

Faleh Al-Shameri, Ph. D.
College of Business
University of Mary Washington
121 Fredericksburg, VA 22406
falshame@umw.edu

ABSTRACT

Data mining associated with massive data sets presents a major problem to the serious data miner. Data sets containing terabytes or more of data preclude any possibility of a human actually looking at the image database and manually categorizing the images. I propose an automated system for automatically scanning the database for certain statistically appropriate feature vectors, recording them as digital objects, and subsequently augmenting the metadata with the appropriate digital objects. The result is that the data miner can do a Boolean search on the augmented metadata and quickly reduce the number of objects to be scanned to a much smaller set of images. The MISR instrument of NASA JPL's satellite TERRA is an excellent prototype database for demonstrating feasibility. The instrument captures radiance measurements which can be converted to georectified images.
A New Approach to Optimal Investment Portfolio Management

Galina N. Nedeltcheva, Ph.D.
Postdoctoral Fellow, Design Engineering Center,
nedeltchevag@mst.edu

Kenneth M. Ragsdell, Ph. D.
Professor, Design Engineering Center Director,
Engineering Management and Systems Engineering,
Missouri University of Science and Technology,
Rolla, MO – USA
ragsdell@mst.edu

ABSTRACT

Traditional practice suggests that an efficient investment portfolio is a portfolio that yields maximum expected return given a prescribed level of risk; or has a minimum level of risk given a prescribed level of expected return. The traditional efficient portfolio and its extension incorporating the single factor model suggested by Markowitz [1], Sharpe [2], and Elton, Gruber, Padberg [3], and Michaud [4] has been explored and implemented in several active portfolio management strategies.

The active optimal portfolio is defined at the tangency of the capital allocation line and the efficient frontier. Portfolio management and asset allocation suggests dividing individual investing into three investment choices. The first choice of investment is an active portfolio, the second is the market index portfolio or passive portfolio, and the third is riskless asset or cash. However, performance of an investment strategy recommended by many fund managers may not be optimal during periods when the market is not efficient or performs irrationally.

One possible explanation for an unimpressive performance of the seemingly efficient portfolio is incorrectness in parameter estimates called “estimation risk in parameter estimates”. Treating sample statistics as population statistics causes estimation risk in portfolio formation. In the Introduction section of the present paper we briefly review studies that can be divided into three groups. The first group conducted their studies based on historical data ignoring estimation risk. This group includes Markowitz [1], Sharpe [2], Kraus and Litzenberger [5], Kroll, Levy and Markowitz [6], and Chunhachinda et al. [7, 8]. The second group of studies take estimation risk into account by proposing a Bayesian or resample efficient frontier approach using historical data together with a Monte Carlo estimation process; for example, Stein [9], Kalymon [10], Barry [11], Klein and Bawa [12], Brown [13], Chen and Brown [14], Jorion [15], Horst et al. [16], Markowitz and Usmen [17], and Michaud [18]. The third group focuses on the asset pricing approach by incorporating a factor model such as the Capital Asset Pricing Model.
(CAPM) and/or Arbitrage Pricing Theory (APT) in the portfolio selection process, for example, Polson and Tew [19], and Pastor [20]. Those authors use a factor model to benchmark the performance of a recommended portfolio.

Proposed Methodology shows that historical data can be used to estimate three crucial parameters of the allocation model, i.e. not only maximizing expected return or minimizing expected risk, and maximizing the difference of expected return and expected risk, but also maximizing the portfolio stability. Stable portfolios consistently earn desired return on investment and appreciate in value irrespective of external economic environment, market conditions and investor sentiments [21]. In the present work we make use of the Taguchi System of Quality Engineering and we show how portfolio stability can be measured by Signal-to-Noise (S/N) ratio of the portfolio value. A stable portfolio exhibits consistent gain in the S/N ratio. The S/N ratio can be used instead of expected portfolio return as an objective optimization function as presented in a case study in Section 3. The paper finally gives in Section 4 conclusions and future work directions.

Emmanuel U. Opara  
Department of Accounting, Finance and MIS  
College of Business  
Prairie View A&M University  
Prairie View, Texas 77446  
 euopara@pvamu.edu

Reginald L. Bell  
Department of Accounting, Finance and MIS  
College of Business  
Prairie View A&M University  
Prairie View, Texas 77446  
 rlbell@pvamu.edu

Milton R. Bryant  
Department of Management and Marketing  
College of Business  
Prairie View A&M University  
Prairie View, Texas 77446  
 mrbryant@pvamu.edu

ABSTRACT

Enterprise systems of all categories are utilizing the internet in an ever-increasing manner to boost business efficiency, enhance communications with clients and partners and, to connect remote offices with workers in a synergistic approach. However, granting access comes with risks. These risks are related to the cyber crimes that have left businesses scrambling for solutions. Enterprise systems are constantly under attack from both inside and outside their respective network parameters. In this article, we used chi-square to test the observed frequencies of stiffening of access, including assigning simple passwords and user IDs and requiring frequent changes in passwords, in order to determine if they are significantly correlated with the reported occurrences of breaches in IT security. We found, astonishingly, no difference in the reported cases of breaches, regardless of the observed IT security protocol. These findings have some serious implications for both IT managers and security experts consulting to business and industry.
Research Gaps Pertaining to the Design of Global Business eLearning Master's Program

Amy Puderbaugh, Ph.D.
Walden University
317 British Columbia Avenue
Lynden, WA 98264
apuderbaugh@comcast.net

ABSTRACT

The purpose of this paper was to examine the unique areas of concern when establishing an eLearning program in the field of global business. A large gap was found in the research material available. However, a survey of eLearning and a global management subject matter and challenges appear. This paper raises practical concerns for future research and proposes questions that should be considered within the design of a global business program.
Section II

Selected Papers
A Queuing Theory Based Model to Estimate the Variability of Waiting Time in Supply Chain Operations

Xiaofeng Zhao, Ph. D.
College of Business
University of Mary Washington,
Fredericksburg, VA 22401

xzhao@umw.edu

ABSTRACT

This paper explores the variability and measurement of waiting time in supply chain operations. In supply chain systems, many important quantities are variable. Because of the prevalence of variability and its disruptive influence on system performance, understanding it is critical to effective supply chain management. We provide a mathematically tractable exact expression for variance (as measured by coefficient of variation) of waiting time for $M/M/1$ queues. We apply this expression to give a two-moment approximation to the standard deviation of waiting time in $GI/G/1$ queue. The measurement requires only the mean and standard deviation or the coefficient of variation of the inter-arrival and service time distributions. It is simple enough to be implemented in manual or spreadsheet calculations, but in comparisons to Monte Carlo simulations has proven to give good approximations (within $\pm 10\%$), under the assumption that the coefficients of variation for the inter-arrival and service times are between 0 and 1.25.

Keywords: Queuing Theory, $M/M/1$, $GI/G/1$, Variance of Waiting Time, Approximation, Supply Chain Operations

INTRODUCTION

Supply chain management is a systematic, strategic coordination of the traditional business functions within a particular company and across companies within the supply chain, for the purpose of improving the long-term performance of the individual companies and the supply chain as a whole. A supply chain is a goal-oriented network of processes and stock points used to deliver goods and services to customers (Hopp 2007).
The fundamental activities of any supply chain system center around the flow of entities through processes (Zhao et al 2010). The entities can be parts in a manufacturing system, people in a service system, jobs in a computer system or transactions in a financial system. The processes can be machining centers, bank tellers, computer CPU’s, or manual workstations. The flows typically follow routings that define the sequences of processes visited by the entities. Clearly, the range of systems that exhibit this type of generic behavior is broad.

In supply chain operations, the key performances are (1) throughput, the rate at which entities are processed by the system; (2) work in process (WIP), the number of entities in the system, which can be measured in physical units or financial units, and (3) cycle time: the time it takes an entity to traverse the system, including any rework, restarts due to yield loss, or other disruptions.

Measuring cycle time directly can be tedious. We must time each entity as it enters the system, record its completion time, and maintain a running average. If we can keep track of WIP and throughput than cycle time, by rearranging Little’s law, we have: Cycle time = WIP/Throughput. Therefore, if we have averages for WIP and throughput, their ratio defines a perfectly consistent measure of cycle time.

Many researchers have explored on cycle time reduction (Shanthikumar, 1980, Hopp and Spearman 2000, Lee 2004). The literature on JIT and lean manufacturing extol the virtues of WIP reduction, while the literature on time based competition and agile manufacturing call for cycle time reduction. However, since Cycle time = WIP/Throughput, Little’s law indicates that WIP and cycle time reduction are really two sides of the same coin. As long as throughput remains constant, any reduction in WIP must be accompanied by a reduction in cycle time and vice versa.
People prefer the system with low WIP and short cycle times—such a system is more efficient in the sense of its ability to convert WIP into throughput. But in practice, supply chain systems can exhibit dramatic differences in efficiency. The answer—and this is a fundamental insight of the science of supply chain—is variability (Hopp 2007). In supply chain systems, many important quantities are variable, including process times, equipment uptimes, equipment downtimes, product demands, yield rates number of workers. Because of the prevalence of variability and its disruptive influence on system performance, understanding it is critical to effective supply chain management.

Queuing theory, which is the study of waiting line phenomena, can reveal the cause and-effect relationships between variability and performance measures in a supply chain system. In supply chain operations, entities queue up behind processes, so that Cycle Time = Waiting Time + Process Time, where delay represents the time entities spend in the system not being processed. There are several causes of delay. One of the most important is queuing delay, in which entities are ready for processing but must wait for a resource to become available to start processing. In this paper, we focus on queuing delay (waiting time).

Most real world queuing problems are the $GI/G/1$ system, which reflects the real world. Unfortunately, without the memory-less property of the exponential distribution to facilitate analysis, we can not compute exact performance measures for the $GI/G/1$ queue. When it comes to exact solutions of multi-server queuing systems, the more one departs from the assumption of exponential, the thornier the problem becomes, especially if this happens for the service time. Due to its inherent complexity, analysis of the $GI/G/1$ queue in general is notoriously difficult.

However, this does not mean that we should give up on modeling queuing systems, only that we need to be concerned with finding good approximations. In contrast, an exact formula may be capable of giving the exact answers to the wrong problem or a mathematically intractable answer to the problem of interest. Consequently, approximations have been studied extensively. New models were developed by means of a two-moment approximation for $GI/G/1$ queue, which makes use of only the mean and standard deviation or coefficient of variation $c$ of the inter-arrival and service time distributions. The approximation method is motivated by the results of Markov queue $M/M/1$ queue. This formula has the form of the exact variance of waiting times for these queues and hence it can be easily calculated. The quality of the approximation is tested by comparing it with simulation results or by comparing it with a few known numerical results in particular cases. The approximations also have the desirable properties of being exact for the specific case of Markov queue model $M/M/1$.

Author focuses on the standard deviation of the total cycle time in a system. In many systems, the “worst case” value of cycle time is very relevant because it represents the lead time that can safely be promised to the customers (So and Song 1995, Larson 1987, Kumar et al 1997, Allon and Federgruen 2008). Predicting the range of variation of the time in the system (rather than just
the average) is needed for decision making. To estimate this they need both the average and standard deviation of the time in system. Research results in literature show that waiting time variance also has a strong impact on supply chain performance measures including Bullwhip effect, holding inventory, stock-out size and number of stock-outs (Lee et al 1997, So and Song 1998, Hopp and Spearman 2000). For instance, variance in supply chain lead time is the key determinant of financial performance. Since customer waiting time is a major factor of lead time and 90-95 % of the time spent in a factory is spent waiting (Hopp and Spearman 2000). How to calculate variance of waiting time is crucial in estimating variance of lead time.

Researcher intends to provide a quick spreadsheet alternative to more elaborate simulation models for analyzing real world systems. Although the approximation derivations may appear complicated, this approximation is simple enough to be implemented in manual or spreadsheet calculations, but in comparison to Monte Carlo simulations has proven to give good measurement (within ± 10%) for cases in which the coefficients of variation for the inter-arrival and service times are between 0 and 1.25. The approximation also has the desirable property of being consistent with the specific case of $\text{M}/\text{M}/1$ queue. The research can be further extended to more complicated situations, such as queues with balking, batching, and optimal design.

Research in literatures has witnessed a growing volume of good quality approximations for average waiting time of the $\text{GI}/\text{G}/1$ queue $W_q$ (Sakasegawa 1977, Kimura 1986, Shore 1988, 2006, Whitt 1993, 2004, Atkinson 2008, Meng et al 2009). While the accuracy of these approximations is usually satisfactory, they often result in algebraically intractable expressions. This hinders attempts to derive closed-form solutions to the decision variables incorporated in optimization models, and inevitably leads to the use of complex numerical methods or to recursive schemes of calculation. Furthermore, actual application of many of these approximations is often obstructed due to the thorough specification that is needed of inter-arrival or service time distribution. No general theoretical formula exist that may provide a platform to calculate control limits for $\text{GI}/\text{G}/1$. There has been no simple method for estimating the range of customer waiting time.

Because of mathematical complications, closed-form solutions have been difficult to achieve. Consequently, approximations have been studied extensively (Whitt 1993). However, all existing approximations appear to be cumbersome or computationally demanding. It often turns out that it is not possible to develop analytical models for some queuing systems, such as the $\text{GI}/\text{G}/1$ queue. It is the popular realization of this fact that has lead to the rush towards simulation techniques. While simulation may offer a way out for many analytical intractable models, it is not in itself a panacea. Simulation needs special training and is at a relatively high cost. There are also a considerable number of pitfalls one may encounter in using simulation. The success or failure of simulation study often lies in how it is used and how the output is interpreted. Because of this, simulation analysis has often been referred to as an art. Therefore, we should explore and propose analytical approximation models.
In addition, all current literature focuses on delay probability and average waiting time. We have seen very little literature dealing with variance of waiting time in the $GI/G/1$ queue as well as its queuing networks and priority classes. Only bounds or approximations of waiting time have been found in the literature. When these bounds are used as approximations, they appear to be rather crude (Boxma et al 1979, Bertsmas 1990). Nevertheless, understanding the variance of flow times in the system is essential to understanding the performance of a queuing system.

**METHODOLOGY**

To develop the approximation of the variance of waiting time, we have studied the equivalent (under the assumption that a good approximation exists for the average time in the queue) problem of finding a mathematically tractable formula of estimating the coefficient of variation of waiting time $c_q = \sigma_q/W_q$, where $W_q$ and $\sigma_q$ are respectively the average and standard deviation of the time in queue. Compared with $\sigma_q$, $c_q$ is more appropriate measure of variability.

We first derive exact results of $c_q$ for Markov queue $M/M/1$. We consider initially $M/M/1$ queuing systems because they yield important intuition and serve as building blocks for more general systems. Then we analyze imbedded Markov chain queuing models. We present the exact formula for $M/M/1$ and show how we apply approximation methods to extend it to general $GI/G/1$ queue. We validate our results via Monte Carlo simulation by using the Extend simulation program. We then apply heuristic methods to approximate the $GI/G/1$ queue. By using the concept of isomorphism and similarity (Whitt 1993, 1999, Seelan and Tijms 1984), we conjecture that for the $GI/G/1$ queue these relationships still hold and all queuing systems have the same relationship. Since we do not assume that $G$ is specified, we must estimate it by assuming some known distribution for the service times, e.g. gamma, for which the third moment can be computed as a function of the average and standard deviation.

Since no closed-form analytical results are available for $GI/G/1$ models, to evaluate the accuracy of our approximations, we conduct Monte Carlo simulation experiments by using the Extend simulation program to gain insights into the heuristic methods for calculating approximate steady-state performance measures of $GI/G/1$ queuing system. The testing of our approximations has been based on extensive simulation experiments.

**Notations**

To use queuing theory to describe the performance of a single queue, we use the following notation and assume the following basic parameters are known:

- $M$: exponential (Markov) distribution
- $G$: general distribution
- $\lambda$: Arrival rate of entering customers
$\mu$: Service rate of each servers  
$\rho$: Average utilization of servers ($\rho = \lambda / \mu$)  
$c_a$: Coefficient of variation of inter-arrival time  
$c_s$: Coefficient of variation of service time  

The performance measures we will focus on are:  
$L$: Average number of customers in system  
$L_q$: Average number of customers waiting in queue  
$W$: Average time a customer spends in system  
$W_q$: Average time a customer spends waiting in queue  
$\sigma_q$: Standard deviation of waiting time  
$c_q$: Coefficient of variation of waiting time  
$P_n(t) =$probability of $n$ customers in system at time $t$

**Exact coefficient of variation of waiting time for M/M/1 Queue**

$M/M/1$ queue is tractable and offers valuable insights into more complex and realistic systems, although not an accurate representation of most systems. The key to analyzing the $M/M/1$ queue is the memory-less property of the exponential distribution. To begin, we require information about the inter-arrival and service times. Since both are assumed to be exponential, all we need to know are the means (because the standard deviation is equal to the mean for the exponential distribution). Beyond that, the only other information we need is how many customers are currently in the system. Because the inter-arrival and process time distributions are memory-less, the time since the last arrival and the time the current customer has been in process are irrelevant to the future behavior of the system. Because of this, the state of the system can be expressed as a single number $n$, representing the number of customers currently in the system. By computing the long-run probability of being in each state, we can characterize all the long-term (steady state) performance measures, including $L_q, L, W, and W_q$.

The various steady state performance measures for $M/M/1$ queue can be computed from the results derived in many literatures (Gross and Harris 1998, 2002, Kleinrock 1975, Hillier and Lieberman 2005). For the $M/M/1$ model, we first parallel Gross & Harris (1985). The density function for the inter-arrival times and services times are given respectively, as  
$a(t) = \lambda e^{-\lambda t}$  
$b(t) = \mu e^{-\mu t}$

Where $1/\lambda$ is the mean inter-arrival time; $1/\mu$ is the mean service time. We define:  
$T_q =$time spent waiting in queue  
$W_q(t) =$the probability of a customer waiting a time less than or equal to $t$ for service.  
$W_q(0) =$Pr{ system empty at an arrival } = Pr{T_q \leq 0} = Pr{T_q = 0}$
\( q_n = \text{conditional probability of } n \text{ customers in the system given arrival is about to occur} \)

\( W_q(0) = P_n = 1 - \rho \)

Since the service distribution is memory-less, the distribution of the time required for \( n \) completions is independent of the time of the current arrival and is the convolution of \( n \) exponential random variables. In addition, since the input is Poisson, the arrival points are uniformly spaced and hence the probability that an arrival finds \( n \) in the system as identical to the stationary distribution of system size. Hence, we may write that:

\[
W_q(t) = \Pr\{T_q \leq t\}
\]

\[
= \sum_{n=1}^{\infty} \left[ \Pr\{n \text{ completions in } t \} \cdot P_n + W_q(0) \right]
\]

\[
= (1 - \rho) \sum_{n=1}^{\infty} P^n \int_0^t \frac{\mu(x)^{n-1}}{(n-1)!} e^{\mu x} dx + (1 - \rho)
\]

\[
= (1 - \rho) \rho \int_0^t e^{-\mu x} \sum_{n=1}^{\infty} \frac{\mu(x)^{n-1}}{(n-1)!} dx + (1 - \rho)
\]

\[
= (1 - \rho) \rho \int_0^t e^{-\mu x(1 - \rho)} dx + (1 - \rho)
\]

\[
= 1 - \rho e^{-\mu x(1 - \rho)} \quad (t > 0)
\]

So the distribution of waiting time in queue is

\[
W_q(t) = \begin{cases} 
1 - \rho & (t = 0) \\
1 - \rho e^{-\mu x(1 - \rho)} & (t > 0)
\end{cases}
\]

With the probability distribution of \( T_q \), we can calculate the expected waiting time, which is denoted by \( W_q \).

\[
W_q = E[T_q] = \int_0^\infty t dW_q(t) \quad \text{(Riemann-Stieltjes)}
\]

\[
= 0 \left(1 - \frac{\lambda}{\mu}\right) + \int_0^\infty \frac{\lambda}{\mu} (\mu - \lambda)e^{-\mu t} dt
\]

\[
= \frac{\lambda}{\mu} \int_0^\infty (\mu - \lambda)e^{-\mu t} dt
\]

\[
= \frac{\lambda}{\mu(\mu - \lambda)}
\]

In order to calculate \( \sigma_q^2 \), we use definition \( \sigma_q^2 = E[T_q^2] - (E[T_q])^2 \)

So we first need to know \( E[T_q^2] \).
\[ E[T_q^2] = \int_0^\infty t^2 dW_q(t) \]
\[ = \int_0^\infty t^2 \frac{\lambda}{\mu} (\mu - \lambda) e^{-(\mu-\lambda)t} dt \]
\[ = \frac{\lambda}{\mu} \int_0^\infty t^2 (\mu - \lambda) e^{-(\mu-\lambda)t} dt \]

In order to calculate above integration, we first look at integration \[ \int_0^\infty t^2 e^{-\lambda t} dt \].

Using integration by parts: \[ \int_0^\infty u(x)dx = u(x)v(x) - \int_0^\infty v(x)du(x) \]

We can obtain:
\[ \int_0^\infty t^2 e^{-\lambda t} dt = \int_0^\infty t^2 d(-e^{-\lambda t}) \]
\[ = -t^2 e^{-\lambda t} \bigg|_0^\infty + \int_0^\infty e^{-\lambda t} dt^2 \]
\[ = \frac{2}{\lambda^2} \]

\[ E[T^2] = \frac{\lambda}{\mu} \int_0^\infty t^2 (\mu - \lambda) e^{-(\mu-\lambda)t} dt \]
\[ = \frac{\lambda}{\mu} \cdot \frac{2}{(\mu-\lambda)^2} = \frac{2\lambda}{\mu(\mu-\lambda)^2} \]

Therefore,
\[ \sigma_q^2 = E[T_q^2] - (E[T_q])^2 = \frac{\lambda}{\mu} \cdot \frac{2}{(\mu-\lambda)^2} - \frac{\lambda^2}{\mu^2(\mu-\lambda)^2} = \frac{\rho(2-\rho)}{\mu^2(1-\rho)^2} \]

We obtain:
\[ c_q = \frac{\sigma_q}{t_q} = \sqrt{\frac{\rho(2-\rho)}{\mu^2(1-\rho)^2}} \cdot \frac{\rho}{(1-\rho)\mu} = \sqrt{\frac{2-\rho}{\rho}} \]

In the previous section, we defined \[ W_q(t) \] the probability of a customer waiting a time less than or equal to \( t \) for service. \[ W_q(t) = P[T_q \leq t] \].

\[ W_q(t) = \begin{cases} 
1 - \rho & (t = 0) \\
1 - \rho e^{-\mu(1-\rho)t} & (t > 0) 
\end{cases} \]

We know \( P(T_q > t) = 1 - P(T_q \leq t) \). So \( P(T_q > t) \) is the probability of a customer waiting a time greater than \( t \) for service. Hence,
The probability of a customer waiting $P(T_q > 0) = \rho$

Therefore, we have

$$c_q = \sqrt{\frac{2 - P(T_q > 0)}{P(T_q > 0)}}$$

$$\Rightarrow \sigma_q = \sqrt{\frac{2 - P(T_q > 0)}{P(T_q > 0)}} \cdot W_q \quad (1)$$

$$\Rightarrow \sigma_q^2 = \frac{2 - P(T_q > 0)}{P(T_q > 0)} \cdot W_q.$$  

To estimate the variance of waiting time, we know from formula (1) that the key point is to calculate the probability of waiting. From the previous discussion, we know the probability of waiting for $M/M/1$ is $P(T_q > 0) = \rho = \lambda/\mu$.

**Approximation method for $GI/G/1$ queue**

Both from a scientific and an aesthetic viewpoint, the most desirable way of resolving problems arising from any queue process is to formulate a precise math model and derive solutions by mathematical analysis. However, the traditional analytical procedure is not usually possible. Without the memory-less property of the exponential to facilitate analysis, we can not compute exact performance measures for the $GI/G/1$ queue. When it comes to exact solutions of queuing systems, the more one departs from the assumption of exponential, the thornier the problem becomes, especially if this happens for the service time (Whitt 1989). Due to its inherent complexity, analysis of the $GI/G/1$ queue in general is difficult.

In this research, we consider the standard steady state $GI/G/1$ queuing system with unlimited waiting room, the first come first served discipline and independent sequence of independent and identically distributed (i.i.d) inter-arrival times and service times. We assume that the general inter-arrival time and service time distributions are each partially specified by their first two moments. Equivalently, we assume that the arrival process is partially specified by the arrival rate $\lambda$ (the mean inter-arrival time is $1/\lambda$). Similarly, we assume that the service-time distribution is partially specified by its process rate $\mu$ (the mean process time is $1/\mu$). All descriptions of these models thus depend only on the basic 4 parameter $\lambda, \mu, c_a, c_s$. To apply the approximations, the above 4 queue specifications are assumed to be known.

Each customer arrives according to an arrival process and is served once at each queue, with the order of the queues being the same for all customers. Each queue has unlimited waiting space, the FIFO discipline, and i.i.d service times that are independent of the other random quantities in
the model. The problem is to determine, for a given fixed external arrival process, the standard deviation of waiting time in system per customer. More generally, the object is to determine if variability and utilization actually matters.

**Average waiting time of the $GI/G/1$ queue**

From formula $c_q = \sigma_q/W_q$, we know that in order to measure $\sigma_q$, we also need to calculate average waiting time $W_q$. We can estimate the average waiting time of $GI/G/1$ queue by means of a two moment approximation, which makes use of only the mean and standard deviation of the inter-arrival and process time distributions. Because it works well, this approximation is the basis of several commercially available queuing analysis packages (Hopp and Spearman 2000). We proceed by introducing an expression for the waiting time in queue $W_q$ and then computing the other performance measures. The approximation for $W_q$, which was first investigated by Kingman, is given by

$$W_q(G/G/1) = \left( \frac{c_a^2 + c_r^2}{2} \right) \left( \frac{\rho}{1+\rho} \right) \frac{1}{\mu}$$

This approximation has several nice properties (Hopp and Spearman 2000). First, it is exact for the $M/M/1$ queue. It also happens to be exact for the $GI/G/1$ queue, although this is not evident from our discussion here. Finally, it neatly separates into three terms: a dimensionless variability term $V$, a utilization term $U$ and a time term $T$, as $W_q(G/G/1) = VUT$. We refer to this as Kingman’s equation or as the VUT equation. From it, we see that if the $V$ factor is less than one, then the waiting time, and hence other congestion measures, for the $GI/G/1$ queue will be smaller than those for the $M/M/1$ queue. Thus, the VUT equation shows that the $M/M/1$ case represents an intermediate case for a single server analogous to that represented by the worst case for waiting.

The VUT equation gives us a tool for analyzing a queue consisting of single server. However, in real-world systems, queuing systems often consists of multiple servers. The reason is that often more than a single server is required to achieve the desired workstation capacity. To analyze and understand the behavior of multi-server queues, we need a more general model.

To develop an approximation for this situation, note that for $GI/G/1$, the approximation can be rewritten as

$$W_q(G/G/1) = \left( \frac{c_a^2 + c_r^2}{2} \right) W_q(M/M/1).$$

(2)

Where $W_q = \frac{\rho}{1-\rho} \cdot \frac{1}{\mu}$ is the waiting time in queue for $M/M/1$ queue.
Whitt (1993) discussed this formula in more detail. Although it may appear complicated, it does not require any type of iterative algorithm to solve and is therefore easily implemented in a spreadsheet program. This also makes it possible to couple the single-station approximation with the multiple-server to create a spreadsheet tool for analyzing the performance of a series of queues. This formula is used in our research when calculating mean waiting time for the $GI/G/1$ queue.

Coefficient of variation of the deviation of waiting time for the $GI/G/1$ queue: For the standard deviation of a general multi-server queue with infinite waiting capacity ($GI/G/1$), we conjecture it has the properties of $M/M/1$ queue as follows.

$$c_q = \sqrt{\frac{2 - P(T_q > 0)}{P(T_q > 0)}}$$

**SIMULATION AND NUMERICAL RESULTS**

Due to the characteristics of the input or service mechanism and the nature of the queuing discipline, or combinations of the above, for $GI/G/1$ queue, it is impossible to model analytically. The alternative methods are to simulate the system. The experiment must be repeated sufficiently often to obtain large samples and a variety of answers, which are then taken together in some manners to obtain a value for what is desired. This is a very useful method in practice whenever complicated problems require immediate answers.

To evaluate the accuracy of our approximations, we conduct simulation experiments using the Extend simulation program.
The testing of our approximations has been based on extensive simulation experiments. We compare the approximations with the simulation values of the standard deviations of waiting time (See appendices). These numerical comparisons show that our approximation performs remarkably well.

In this simulation research, we concentrate on a single queue. To estimate the mean and standard deviation of steady-state waiting times, we conduct experiments using the Extend simulation program. In each case, we performed independent replications using 54000 minutes of simulation time and estimated 95% confidence intervals.

We characterize the queuing models by the parameters $c_a, c_s$ and $\rho$. Here $c_a$ is the coefficient of variation of an inter-arrival time; $c_s$ is the coefficient of variation of the service time; $\rho$ is the utilization. We specify the distributions to go with the first two moments. We considered various parameters for all combinations of the utilization $\rho=0.1, 0.2, 0.4, 0.8, 0.9, 0.95, 0.99$. For each queue, we consider 7 values of $c_a$ and $c_s$: 0, 0.25, 0.5, 0.75, 1, 1.25 and 1.5. Thus, with 8 utilizations, we have 196 cases.

When coefficient of variation $c=0$, we use a deterministic distribution; when $c=0.25, 0.5, 0.75, 1.25$ and 1.5 Gamma or Normal distribution; and $c=1$ exponential distribution. For a
deterministic distribution, we can calculate constant inter-arrival rate and constant service rate. For an exponential distribution, we calculate inter-arrival rate \( \lambda \) and process rate \( \mu \). For the Gamma distribution, we first calculate scale and shape parameters. We then key in the parameters in the Extend simulation blocks to obtain different queuing models.

Weibull, Erlang, lognormal or Pareto were used as the \( GI/G/1 \) queue in simulation literature (Whitt 2004). In our research, Gamma distribution is used as general distribution. When shape parameter \( k \) is positive integer, Gamma is called Erlang. When \( k = 1 \), it is exponential. When \( k \to \infty \), it is deterministic. PDF of Gamma distribution (Hillier and Lieberman2005):

\[
f(x;k;\theta) = x^{k-1} \frac{e^{-\frac{x}{\theta}}}{\theta^k \Gamma(k)} \quad \text{for } x>0.
\]

Where \( k (>0) \) is the shape parameter; \( \theta (>0) \) is the scale parameter; \( \Gamma(a) = \int_0^\infty t^{a-1}e^{-t} dt \). CDF of Gamma distribution: \( F(x;k;\theta) = \int f(x;k;\theta) = \frac{r(k,x/\theta)}{\Gamma(k)} \).

**Numerical comparisons**

We present a representative set of tables comparing the approximations with exact (simulation) values. Before discussing these tables in detail, we comment how we evaluate the quality of the approximations.

There are two standard ways to measure the quality of queuing approximations: absolute difference and relative percentage error (Whitt 1993). We contend that neither procedure alone is usually suitable over the entire range of values. We can obtain satisfactory results if either the absolute difference is below a critical threshold or the relative percentage error is below another critical threshold. Thus, a final adjusted measure of error (AME) might be:

\[
Error = \min \left\{ \frac{|exact - approx|}{exact}, \frac{100|exact - approx|}{exact} \right\}.
\]

A is a constant chosen in each instance to reflect the relative importance of absolute difference and the relative percentage of error.

In our comparisons, we choose \( A=1 \) for simplicity. Although we don’t display the calculations of any specific measures of errors, our discussion explains the goals. Either the relative percentage error or the absolute difference should be small. Here we have simulation results corresponding to different experiments. These tables display expected mean and standard deviation of cycle time in specific queuing systems. The difference and relative error analysis are displayed in a separate spreadsheet. For those cases with both \( c_a, c_s \leq 1.25 \), the approximations appear to be remarkably accurate.

Consistent with remarks by Hopp and Spearman (2000) and Whitt (2004), but deserving more emphasis, we conclude that the key factor is variability. The results indicate that if the coefficient

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of variation (either inter-arrival or service time) is 1.5, our approximations are not precise. However, when the coefficient of variation is small, we can see simulation results match with spreadsheet results well regardless of utilization and server number. Overall, the approximations seem to be sufficiently accurate for practical operations purposes.

CONCLUSION

In this research, we have developed mathematically tractable expressions for the standard deviation of waiting time for $M/M/1$ queue. We provide an approximation for the standard deviation of flow time in system for a general single-server queue with infinite waiting capacity ($GI/G/1$). The measurement requires only the mean and standard deviation or the coefficient of variation of the inter-arrival and service time distributions, and the number of servers. We also extend the approximations to the $GI/G/1$ priority queues and queuing networks. The quality of the approximations is not the same for all cases, but in comparisons to Monte Carlo simulations has proven to give good approximations (within $\pm 10\%$) for cases in which the coefficients of variation for the inter-arrival and service times are between 0 and 1.25. A significant feature of the approximation methods is that it is mathematically intractable and can be implemented in a spreadsheet format.

We derive the standard deviation of waiting time in system for $M/M/1$ queues. We found that for all these queue models, the following relation holds regardless of distribution:

$$\sigma_q = \sqrt{\frac{2 - P(T_q > 0)}{P(T_q > 0)} W_q}.$$  

$\sigma_q$ is just a function of $P(T_q > 0)$ and $W_q$, i.e. Standard deviation of waiting time is just a function of probability of waiting and average waiting time.

We develop a queuing system performance predictor based upon the above results. The prediction generalizes the approximations proposed in our research. For these models, we only need the basic 4 parameters $\lambda, \mu, c_a, c_s$ to measure the performances of all kinds of steady-state unlimited capacity queues. We believe that our two moment approximation will be beneficial to those practitioners who like simple and quick answers to their queuing systems.

For coefficient of variations of inter-arrival time or service time greater than 1.25 the approximations are less reliable. Its performance tends to deteriorate as $c_s$ and $c_a$ get further away from 1, especially in the case of high utilizations. Currently, we know of no general models for the standard deviation of waiting time with the coefficients of variation outside this range $c_a, c_s \leq 1.25$. Also no computer package is commonly available that would enable us to compute exact performances numerically. For these cases, they have not yet been studied sufficiently and such descriptions evidently depend more critically on the missing information (the discussions beyond the first two moments). More sophisticated numerical procedures are needed for those cases.
For simulation testing we have considered different combinations of four values of $c_a$ and $c$, respectively: 0, 0.25, 0.5, 0.75, 1, 1.25, 1.5 with four utilizations $\rho = 0.1, 0.2, 0.4, 0.8, 0.9, 0.95, 0.99$. The other combination values of $c_a$ and $c$ needs to be tested to make sure our approximations can be used in a wide range of applications. In the literature, we have seen Seelan and TIJM (1984) and Whitt (1989) used Erlang and H (hyper-exponential) distribution to represent general distribution. In our simulation experiments, we have used gamma and normal distributions to represent general distribution. We can test other distributions, such as hyper-exponential and Weibull.

The research results can be extended to estimate the performances of increasingly complex and realistic situation, such as batch, balking, optimal design and other queuing system applications. The approximation models presented in this research could be used in scheduling, inventory, communication, insurance management, reliability and maintenance, web service, call center, and many other service and manufacturing operations and supply chain systems.

**APPENDIX**

We plot the chart using a common y axis scale (from -10% to 10%) for comparison purposes of error.

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Table 1. Comparison of approximation and simulation results

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Values as Determinants of Motivation to Lead

Alton B. Clemmons III, PhD
PSC 2 Box 11312
APO AE 09012
011-491-6371-4056961
al.clemmons@yahoo.com

Dail Fields, PhD
Regent University
School of Global Leadership and Entrepreneurship
1000 Regent University Drive
Virginia Beach, VA 23464-9800
dailfie@regent.edu

ABSTRACT

This study examined the incremental contribution of personal values in determining three forms of MTL within a sample of military personnel. The study investigated values as predictors of affective-identity MTL, social-normative MTL, and non-calculative MTL. The personal values investigated were spirituality, integrity, and willingness to serve, which operationalized self-transcendence value orientation as defined by the Schwartz Value Theory, and desire for power and achievement, which operationalized self-enhancement value orientation. In multivariate analyses which controlled for individual characteristics found previously to predict the three forms of MTL, we found that personal values made significant incremental contribution to the explanation of the three forms of MTL. Values had the largest incremental effect in explaining non-calculative MTL. Desire for power and achievement had a larger positive relationship with affective-identity MTL than did spirituality, integrity, and willingness to serve. Surprisingly, desire for power and achievement also had a larger positive relationship with social normative MTL than did the self-transcendence values and self-transcendence values had a significantly larger relationship with non-calculative MTL than did desire for power and achievement.

Keywords: Personal values, motivation to lead, spirituality, integrity, willingness to serve, power and achievement
INTRODUCTION

Chan and Drasgow (2001) developed and examined an individual difference construct defined as the motivation to lead (MTL) which describes a person’s efforts to assume leadership training, roles, and responsibilities. Across three samples of over 2000 subjects, Chan and Drasgow found empirical support for three dimensions of MTL. These are affective-identity, social normative, and non-calculative forms of motivation to be a leader. These alternative forms of MTL reflect the reality that a) some people just like to lead others and are directed primarily by affective MTL; others will put forth the effort to lead because of a sense of duty or responsibility and are directed by social-normative MTL; and c) different people may only lead if they are not calculative about the costs and benefits of leading and thus may be directed by non-calculative MTL. These three dimensions of MTL have been empirically supported in other settings (Amit, Lisak, Popper, & Gal, 2007; Chan, Rounds & Drasgow, 2000).

In investigating alternative antecedents for each type of MTL, Chan and Drasgow (2001) found that personality dimensions, previous leadership experiences, leadership self-efficacy, and socio-cultural values had different relationships with the three types of MTL. The effects of socio-cultural variables on affective-identity and social-normative MTL were relatively weak compared to personality, leadership experience, and self-efficacy variables. The relative effects of socio-cultural variables compared to the other variables were larger for non-calculative MTL. These results were in conflict with previous studies that have found that personal values may be substantial determinants of work motivations (Ajzen, 1991; Locke & Latham, 1990; Rokeach, 1973; Spangler, 1992; Von Rosenstiel et al., 2000).

The limited predictive effects of the values variables in Chan and Drasgow’s study may reflect their use of measures that primarily describe preferences for social/cultural roles (horizontal/vertical individualism and/or collectivism in cultural outlook) rather than personal beliefs. Thus these variables may not be strong predictors of personal motivation (Schwartz ). In extensive multi-cultural studies, Schwartz and colleagues (1992; 1999) have shown that ten distinct value areas motivating behaviors can be aggregated into two sets of competing value orientations. This study focuses on the incremental contribution of the competing values of self-enhancement (achievement and power) vs. self-transcendent (universalism and benevolence) to explanation of each type of motivation to lead. We investigate the effects of these predictors of MTL is a sample of 231 U.S. military personnel.
THEORETICAL BACKGROUND

Motivation to lead
In their original work on motivation to lead, Chan and Drasgow (2001) proposed and found evidence for three alternative forms of MTL

- Affective MTL where an individual is motivated to lead by an inner desire resulting from the satisfaction and pleasure he/she derives from the fact of being a leader.
- Social-normative motivation to lead, where an individual is motivated to lead by social and normative motives, such as a feeling of commitment to the group or norms prevalent in the social environment.
- Noncalculative motivation to lead, where an individual seeks leadership roles without apparent assessment of the costs and benefits related to the leadership role. In Chan and Drasgow’s view every leadership role involves a certain sacrifice, so the less calculative a person, the greater the probability that he/she will be willing to be a leader.

People who score high on affective-identity MTL prefer to lead and see themselves as leaders. These individuals tend to be outgoing and sociable, value competition and achievement, have more past leadership experience than their peers, and are confident in their own leadership abilities (Chan, Rounds & Drasgow, 2000). Individuals who score high on Social-Normative MTL have strong sense of social duty and obligation, are accepting of social hierarchies but tend to reject social equality. These individuals also tend to have substantial past leadership experience and confidence in their leadership abilities. Individuals scoring high in non-calculative MTL do not generally calculate the costs and benefits of undertaking leadership responsibilities. The three dimensions of MTL were confirmed within a sample of Israeli military personnel (Amit, Lisak, Popper, & Gal, 2007). Amit and colleagues (2007) also found evidence for patriotic and ideological motivations to lead within their Israeli sample.

Antecedents of MTL
The primary determinants of affective-identity MTL are extraversion, extent of previous leadership experience, and leadership self-efficacy (Chan & Drasgow, 2001). Tendencies toward achievement and competitive behavior was also positively related to levels of affective-identity MTL. Social-normative MTL was primarily predicted personality factors of extraversion, agreeableness, and conscientiousness, as well as previous leadership experience and leadership self-efficacy. Cultural tendencies were related to this type of MTL, but the effects are difficult to interpret since variables both describing individuals individual achievement orientation, and willingness to subordinate personal interests to the collective good were predictors of social-normative MTL (Chan & Drasgow, 2001). Finally, non-calcultative MTL was predicted primarily by extraversion, emotional stability, previous leadership experience, and leadership self-efficacy. Collectivism measures were positively related, while individualism variables were negatively related with non-calcultative MTL (Chan & Drasgow, 2001).
In subsequent research, Kark & Van Dijk (2007) suggested that both self-regulatory focus and personal values may predict each type of MTL. Self-regulation refers to the process by which people seek to align themselves (i.e., their behaviors and self-conceptions) with appropriate goals or standards (Brockner & Higgins, 2001). Specifically, people tend to have two basic self-regulation approaches. One regulates the achievement of rewards and focuses individuals on promotion goals, while the other regulates the avoidance of punishments and focuses individuals on prevention (Kark & Van Dijk, 2007). Individuals who operate primarily within promotion self-regulatory focus are primarily concerned with accomplishments and aspirations, are likely to be sensitive to the presence or absence of rewards, are more creative in problem-solving processes, and show more willingness to take risks. Individuals with chronic promotion-oriented regulatory focus seek to do things because they want to and wish to actualize their ideal self (Kark & Van Dijk, 2007).

Values are beliefs that pertain to desirable end states or modes of conduct that transcend specific situations, guide the evaluation of behavior, people, and events, and are ordered by importance relative to other values to form a system of priorities (Schwartz, 1994, p. 20). While personal values have been measured in a variety of ways (Fields, 2002), the framework developed and extensively tested by Schwartz (1992; 1999) is widely recognized. The Schwartz Value Theory views “values as conceptions of desirable trans-situational goals that vary in importance and serve as guiding principles in the life of a person or other social entity” (Schwartz, 1994, p21). The ten motivationally distinct values identified by Schwartz (1992, 1994) have also been aggregated into two sets of competing value orientations. The first is conservation focused on conformity, tradition, and security vs. openness to change (stimulation, and hedonism). The second is self-enhancement focused on personal achievement and power vs. self-transcendent, focused on universalism (broad-minded, social justice, and equality) and personal benevolence (honesty, helpfulness, spirituality). Lord and Brown (2001) illustrated how a leader’s value orientation toward self-enhancement or self-transcendence may affect leader behaviors and subsequently trigger values and related behavior patterns among followers. In particular, personal value orientations toward self-enhancement or self-transcendence may play a significant role in activating different types of MTL (Lord & Brown, 2001). Chronic self-regulatory focus and personal values are likely to be significantly correlated (Kark & Van Dijk, 2007). In particular, self-enhancement personal values conceptually overlap promotion oriented self regulatory focus. Therefore this study focused on only on self-transcendence and self-enhancement personal values as defined by the Schwartz value theory.

**Study Hypotheses**

Affective-identity MTL is based on a personal internal desire to take a leadership role and may reflect personal rewards such as status, satisfaction, and pleasure derived from being a leader. Thus self-enhancement values, reflecting a desire for personal power and achievement, are likely to be a stronger predictor of this type of MTL than are self-transcendence values.
H1: Self-enhancement values will be positively related to affective-identity MTL and this relationship will be larger than that for self-transcendence values.

On the other hand, social-normative MTL is based in motives besides personal gains like power. This may include commitment to a group or response to norms for taking a leadership role to give to society. Thus self-transcendence values are likely to have a stronger relationship with social normative MTL than do self-enhancement values.

H2: Self-transcendence values will be positively related to affective-identity MTL and this relationship will be larger than that for self-enhancement values.

Non-calculative MTL seems to reflect a drive to lead that could be explained by either self-enhancement motives or self-transcendent values. Therefore both types of values may be positively related to levels of non-calculative MTL.

H3: Both self-enhancement and self-transcendence values will have similar positive relationships with non-calculative MTL.

METHODS

Sample

The sample for this study was drawn from students assigned to two Air University leadership courses, Air War College and the U. S. Air Force Senior Noncommissioned Officer Academy. The schools are respectively located at Maxwell Air Force Base and Gunter Annex in Montgomery, Alabama. Air War College is the senior school in the Air Force Professional Military Education (PME) system. It educates selected senior officers, primarily those in the grade of Lieutenant Colonel, to lead at the strategic level in the employment of air and space forces. The curriculum focuses on coalition warfighting and national security issues with emphasis on the effective employment of aerospace forces in joint and combined operations (U.S. Air Force Air University, 2006). As of this study, the Air War College had 149 students in residence. Of that number, 110 participated in the study. The U.S. Air Force Senior Noncommissioned Officer (NCO) Academy annually graduates more than 1,800 Chief Master Sergeant selects, Senior Master Sergeants, and selected Master Sergeants (U.S. Air Force Air University, 2006). This school specializes in advanced learning for senior enlisted leaders in three curriculum areas: profession of arms, communication, and leadership and management. At the time of this study, the Senior NCO Academy had 363 students in session. Of that number, 121 participated in this study.

Based on discussion with the staff and faculty of Air University, it was estimated that approximately 25% of the possible 512 participants would voluntarily participate in the research study for a pool of approximately 128. The actual results yielded 231 participants, a 45% response rate. This specific sample is relevant for this study because each participant was
enrolled into a tenure-driven leadership school of some type. As such, each participant is expected to assume advanced leadership roles in their respective organizations upon course completion.

In order to determine the implications of combining the two subsamples of students, a one-way analysis of variance was performed to compare the level of MTL in each subsample. The analysis of variance indicated no significant difference in the level of MTL between the two subsamples \[F(1,229) = .398, \ p = .529\]. Although a Levene test for homogeneity of variance indicated the probability that MTL may not have the same variance in each subsample, the lack of significant difference in the mean scores of the two groups suggests that MTL in each group is comparable. Thus, the two subsamples were combined to create one sample of 231 cases for the analysis in this study.

**Demographics**

As noted, the sample size for this study was 231 Air University students. Participation in the research study was both voluntary and anonymous. The sample was comprised of 191 males (82.7%) and 40 females (17.3%). This sample is consistent with the total Air Force population which is comprised of 80.4% males and 19.6% females (U.S. Air Force, 2008). Participants fell into five age categories with the vast majority in the 41-45 years age group (60.6%).

The participants comprised five noted ethnicities with the vast majority (83.1%) registering as Caucasian. This sample is fairly consistent with the total Air Force population which is comprised of 73.8% Caucasians and 2.44% Asians (U.S. Air Force, 2008). The total Air Force population, however, has a representation of 14.7% African-Americans and 9.41% Hispanics (U.S. Air Force, 2008) which is slightly higher than the representation for this sample (8.7% and 3.5% respectively).

**Measures**

**Motivation to Lead**

The MTL scale, as devised by Chan and Drasgow (2001), is comprised of the three MTL components with each one consisting of 9 items for a total of 27 items. The overall MTL scale is anchored on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The overall MTL scale is delineated into three subscales: affective-identity MTL, social normative MTL, and noncalculative MTL. The scale for affective-identity MTL, a nine-item scale, includes such statements as “Most of the time, I prefer being a leader rather than a follower when working in a group.” The scale for social normative MTL, a nine-item scale, includes such statements as “I feel that I have a duty to lead others if I am asked.” Finally, the scale for noncalculative MTL, a nine-item scale, includes items such as “I am only interested to lead a group if there are clear advantages for me.” In this study sample, reliability scores for affective-identity MTL, social normative MTL, and noncalculative MTL were \(\alpha = .82\), \(\alpha = .78\), and \(\alpha = .82\) respectively. Furthermore, the composite MTL scale showed reliability at \(\alpha = .89\). The reliability scores in this present study are consistent with Chan and Drasgow’s work.

**Self-transcendence values**
We used three measures of values integral to self-transcendence values as conceptualized and operationalized by Schwartz (1999). These measures covered individual spirituality, personal integrity, and willingness to serve. Spirituality has been defined broadly but consistently tied to personal value systems and defined as the pursuit of high ideals (Pincipe, 1983 and fulfillment of personal development (Delbec, 1999). Within the workplace, Mitroff and Denton (1999) concluded that personal development of spirituality is a critical issue in the organizational environment as it facilitates the value of people and the desire to create integrity, trust, respect, and faith in others. Integrity is often linked in research to moral and ethical behavior wherein behaviors such as kindness, honesty, and concern for others abound (Dalton & Petrie, 1997). Quinn (2004) indicated that people are often driven by naturally occurring challenges to higher levels of integrity and greater capacity to exert transformational influence. To that end, the U.S. Air Force (1997) has defined integrity as “the willingness to do what is right even when no one is looking. It is the ‘moral compass’—the inner voice; the voice of self-control; the basis for the trust imperative in today’s military” (p. 5). A person’s willingness to serve has received limited attention in the research literature (Rama et al., 2000). The U.S. Air Force espouses that service before self includes, at a minimum, respect for others, discipline and self-control, and faith in the system. This seemingly altruistic perspective implies that members must choose to serve others before they serve themselves which necessitates altruistic helping behaviors. The specific operationalizations used in this study were as follows. 

**Spirituality.** While there are many instruments for measuring spirituality, the one most consistent with this research was Ashmos and Duchon’s (2000) Spirituality at Work Scale. This particular scale had five items on a seven-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). The scale used statements like “I feel hopeful about life” and “I care about the spiritual health of my coworkers.” For this current study, the Spirituality at Work Scale was α = .86.

**Integrity.** Since the literature regarding a specific integrity measure was sparse at best, the most effective scale proposed for this study was the HEXACO-PI Honesty–Humility scale. It had 16 items (subscales for modesty and sincerity) measured on a five-point scale anchored by 1 (strongly disagree) and 5 (strongly agree) (Lee & Ashton, 2004; Lee, Ashton, & deVries, 2005; Lee, Ogunfowora, & Ashton, 2005). Reliability was α = .79 for the composite scale.

**Willingness to serve.** To measure the willingness to serve construct, the Self-Efficacy Toward Service Scale (Weber, Weber, Sleeper, & Schneider, 2004) was used. They found that “self-efficacy towards service can . . . predict the development of student intention and willingness to be a responsible agent in society. The instrument . . . examines self-efficacy to contribute time and service to the public good” (p. 361). It is a five-item, five-point Likert-type scale anchored by 1 (strongly disagree) to 5 (strongly agree). It used statements like “I can have a positive impact on social problems” and “I can make a difference in my community”. In the study sample, the scale reliability was α = .87.

**Self-enhancement values**

We measures self-enhancement values as power and achievement. The instrument used for this study was initially developed by Turner (1996). The survey items were developed based on
McClelland’s (1982) three qualities of achievement, affiliation, and power. Some of Turner’s questions were modified in a similar instrument used by Chusmir (1989). While Chusmir provided an instrument to measure power, achievement, and affiliation, only the first two were used in this current research. There were five items for each of the two factors, and each used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In this study, the reliability was α = .75 for power and α = .51 for achievement. The reliability of the composite scale was α = .66. As a result, the composite scale was used in this study.

Control variables

In previous analysis of the antecedents of each type of MTL within military samples, Chan and Drasgow (2001) found significant effects for personality variables, a military attitudes scale, previous leadership experience and leadership self-efficacy. Therefore we controlled these variables in this study in order to identify the incremental effects of personal values on MTL.

Personality variables. Gosling, Rentfrow, and Swann (2003) developed a Ten-Item Personality Inventory (TIPI) as an abbreviated way to measures the Big 5 personality variables. The common stem for the descriptors, “I see myself as . . .” was then rated on a 7-point scale anchored by 1 (strongly disagree) and 7 (strongly agree). This particular scale has five subscales with two items each for extraversion, agreeableness, conscientiousness, emotional stability, and openness to new experiences. We included only extraversion, agreeableness and conscientiousness as controls on this study based on the previous analysis performed by Chan and Drasgow (2001).

Military Attitudes. To assess military regard for excellence, Hall’s (1968) Professionalism Scale was used. The instrument contains three 4 item subscales anchored by 1 (strongly disagree) to 5 (strongly agree). These scales measure social obligation, belief in self-regulation, and professional dedication. In assessing social obligation, one of the statements was: “Military members are essential to the welfare of society.” An example of a question regarding belief in self-regulation was: “Military members are better judges of other military members than non-military members would be.” And, as an example of dedication to the profession, one of the statements was: “It is encouraging to see a military member who is idealistic about his/her work.” For the study sample, the reliability of the overall scale used in this study was α = .82.

Self-Efficacy. Chen, Gully, and Eden’s (2001) New General Self-Efficacy Scale was used in this study. The responses to the eight-item, five-point scale range from 1 (strongly disagree) to 5 (strongly agree). It uses items consistent with individual differences and motivation such as “Even when things are tough, I can perform quite well.” Reliability for this current study was α = .86.

Previous leadership experience. Since the volume of participants for this study was more than 200, and their individual records were not disclosed, a self-report measure was utilized to measure previous leadership. Three questions were used, but reliability analysis revealed that the third question was not significantly correlated with the first two. As such, two items (“I consider myself successful in regards to previous leadership experiences” and “My previous leadership
experiences motivate me to consider accepting newer, more challenging leadership roles”) were used individually as control variables in this study.

Participants completed one survey of 106 items. Air University staff distributed the survey link via e-mail to students. The survey link was web based and produced by Air University research personnel. Surveys were filled out anonymously. The questionnaire took approximately 15-20 minutes to complete.

RESULTS

The means, standard deviations, and correlations among the study variables are show in Table 1.

| Insert Table 1 about here |

The correlations among the three forms of MTL are positive and significant (mean r = .48, p < .01). It is important to note that the largest correlation among the independent variables was .60, suggesting that multicollinearity is not a substantial concern in the multivariate regression analysis.

We tested the hypotheses by estimating the parameters for three multivariate regression models each predicting one type of MTL. The regression models are shown in table 2.

| Insert Table 2 about here |

In the regression model predicting affective-identity MTL shown in column A of table 2, the variables operationalizing personal values caused a significant incremental change in the fit of the regression model ($\Delta R^2 = .06, p < .01$). The relationship of power and achievement (which operationalized self-enhancement values) with affective-identity MTL was positive and significantly larger than the relationship of the variables operationalizing self-transcendence values (t = 6.87, p < .01). These results support hypothesis 1.

In the regression model predicting social-normative MTL shown in column B of table 2, personal values also caused a statistically significant change in the fit of the regression model ($\Delta R^2 = .03, p < .01$). The effect of personal values variables on this form of MTL was substantially smaller than for affective-identity MTL or non-calculative MTL. Although hypothesis 2 predicted that variable operationalizing self-transcendence values would have a positive and relationship with social-normative MTL that would be larger than that for self-enhancement values. The regression results show the opposite, as the coefficient for power and achievement is larger (t = 3.60, p < .01) than the coefficient for integrity (the only significant coefficient of the variables operationalizing self-transcendence values). Thus hypothesis 2 is partially supported.
In the regression model predicting non-calculative MTL shown in column B of table 2, the addition of the personal values variables caused a significant improvement in the fit of the regression model (ΔR² = .22, p < .01). The relationship of the values variables with non-calculative MTL is considerably larger than the relationship of these variables with affective-identity MTL or social normative MTL. Hypothesis 3 predicted that both self-enhancement and self-transcendence values would be positively and similarly related to non-calculative MTL. However, the regression coefficient for power and achievement (operationalizing self-enhancement values) is negative. The coefficients for integrity and willingness to serve (both operationalizing self-transcendence values) are positive and significantly larger than the coefficient for power and achievement (t = 10.3, p < .01 for integrity and t = 5.3, p < .01 for willingness to serve. These results partially support hypothesis 3.

DISCUSSION

This study set out to examine the incremental contribution of personal values in determining three forms of MTL within a sample of military personnel. The study investigated values as predictors of affective-identity MTL, social-normative MTL, and non-calculative MTL. The personal values investigated were spirituality, integrity, and willingness to serve, which operationalized self-transcendence value orientation as defined by the Schwartz Value Theory, and desire for power and achievement, which operationalized self-enhancement value orientation. In multivariate analyses which controlled for individual characteristics found previously to predict the three forms of MTL, we found:

- Personal values made significant incremental contribution to the explanation of the three forms of MTL. Values had the largest incremental effect in explaining non-calculative MTL.
- Desire for power and achievement had a larger positive relationship with affective-identity MTL than did spirituality, integrity, and willingness to serve.
- Surprisingly, desire for power and achievement also had a larger positive relationship with social normative MTL than did the self-transcendence values.
- Self-transcendence values had a significantly larger relationship with non-calculative MTL than did desire for power and achievement.

There were several unexpected results. First, in the regression model predicting affective-identity MTL, spirituality had a negative coefficient. This would indicate that a person with higher levels of spirituality would not choose to lead because he or she liked the idea of leading. Our measure of spirituality covered not only a personal interest in connection with God, but also hopefulness and concern for the spiritual well being of others. The negative relationship with affective-identity MTL may suggest that more spiritually oriented military personnel see conflict between their spiritual values and the perceived requirements for being a military leader. Clearly this relationship begs for further investigation.

Second, self-transcendence values had a weaker relationship with social-normative MTL than did desire for power and achievement. Although we controlled for the importance of regard for
excellence within a military sample, this result may reflect a perceived norm among military personnel that it a responsibility to ‘step up’ in situations where it is important for someone to take a leadership role. And that doing so will ultimately result in greater achievement for those who step in lead when a perceived requirement exists. Those with higher levels of integrity also see such situations as needing their leadership involvement, but their motivation may be driven more by obligation than desire.

Finally, contrary to expectations, self-transcendence values had a much larger relationship with non-calculative MTL than expected, and desire for power and achievement was negatively related with this type of MTL. Previous theoretical and empirical investigation of non-calculative MTL has shed little light on this form of MTL in terms of the type of personal characteristics that are associated with non-calculative behaviors (Chan & Drasgow, 2001; Kark & Van Dijk, 2007). Our results suggest that those with higher levels of desire for power and achievement may rarely experience this form of motivation, but those who value social harmony and the welfare of others (qualities inherent to self-transcendence values) may experience a strong pull to take on leadership roles when needed.

A key strength of this study is that it adds to the field of research regarding personal values, motivation, and leadership. A limitation of this study is its exclusive reliance on self-report measures of MTL. Another limitation is that all of the participants were military members who had been selected for further leadership training. As a result, it is plausible that the participants may have answered survey questions by how they would like to be seen.

DIRECTIONS FOR FUTURE RESEARCH

Integration of Values into MTL Research

Leaders consistently aspire to motivate others and, more specifically, motivate them to lead in a tumultuous climate. Values are key variables in motivation and leadership. Since this work established that personal values can and do influence MTL, future empirical studies should include personal values as a key variable in predicting both MTL as well as subsequent leadership behaviors (Kark & Van Dijk, 2007; Lord & Brown, 2001).

Since Chan and Drasgow (2001) have established a research thread accounting for individual differences relating to MTL, it seems logical that a parallel research thread might be possible relating to motivation to follow (MTF). It seems plausible that a person might exhibit any of the three MTL components as it relates to his or her motivation to accept or decline follower roles. Someone with affective-identity MTF, for example, would follow because he or she likes the idea of following. Someone with social normative MTF might follow because he or she has a sense of obligation to someone or something. Someone with noncalculative MTF might follow without consideration for the risks or rewards of that decision. Thus, future research regarding a new theory for followership is reasonable.
REFERENCES


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### Table 1 Means, standard deviations and correlations among the study variables (N= 230)

| Variables                | Mean | SD  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  |
|--------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. A-I MTL               | 31.9 | 4.80| ----|     |     |     |     |     |     |     |     |     |     |     |
| 2. S-N MTL               | 35.1 | 4.16| .53 | ----|     |     |     |     |     |     |     |     |     |     |
| 3. N-C MTL               | 38.3 | 4.33| .40 | .52 | ----|     |     |     |     |     |     |     |     |     |
| 4. Power/Ach.            | 36.3 | 4.02| .48 | .61 | .24 | ----|     |     |     |     |     |     |     |     |
| 5. Spirituality          | 28.9 | 5.53| .12 | .27 | .37 | .20 | ----|     |     |     |     |     |     |     |
| 6. Integrity             | 64.8 | 6.71|     | .24 | .45 | .72 | .18 | .43 | ----|     |     |     |     |     |
| 7. Willing to serve      | 21.4 | 2.71| .37 | .61 | .60 | .50 | .56 | .47 | ----|     |     |     |     |     |
| 8. Extraversion          | 9.4  | 3.08| .38 | .35 | .34 | .19 | .31 | .20 | .39 | ----|     |     |     |     |
| 9. Agreeableness         | 10.4 | 2.05| .17 | .25 | .34 | .18 | .55 | .46 | .44 | .22 | ----|     |     |     |
| 10. Conscientiousness    | 11.7 | 1.99| .07 | .24 | .29 | .15 | .34 | .27 | .36 | .18 | .36 | ----|     |     |
| 11. Mil. Reg. for Exc.   | 48.0 | 5.92| .47 | .72 | .59 | .48 | .40 | .54 | .64 | .45 | .34 | .18 | ----|     |
| 12. Self-efficacy        | 32.4 | 3.69| .35 | .70 | .49 | .56 | .21 | .38 | .69 | .28 | .25 | .34 | .60 |     |

Correlations larger than .13 are significant at p < .05; correlations larger than .17 are significant at p < .01
### Table 2 Regression models predicting affective-identity MTL, social-normative MTL, and non-calcultative MTL

<table>
<thead>
<tr>
<th>Variables</th>
<th>(A) Affective-identity MTL</th>
<th>(B) Social-normative MTL</th>
<th>(C) Non-calcultative MTL</th>
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<tr>
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<td>b</td>
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<tr>
<td>Controls</td>
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<tr>
<td>Extraversion</td>
<td>.38**</td>
<td>.09</td>
<td>.10</td>
</tr>
<tr>
<td>Agreeableness</td>
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<td>.15</td>
<td>-.07</td>
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<tr>
<td>Conscientiousness</td>
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<td>.04</td>
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<tr>
<td>Mil. Regard for Excellence</td>
<td>.18**</td>
<td>.07</td>
<td>.23**</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>-.21</td>
<td>.11</td>
<td>.30**</td>
</tr>
<tr>
<td>Prev. leadership success</td>
<td>1.12**</td>
<td>.44</td>
<td>-.23</td>
</tr>
<tr>
<td>Prev. leadership motivation</td>
<td>1.95**</td>
<td>.45</td>
<td>1.14**</td>
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<tr>
<td>Δ R²</td>
<td>.38**</td>
<td></td>
<td>.67**</td>
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<td>Independent</td>
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<tr>
<td>Power/achievement</td>
<td>.33**</td>
<td>.08</td>
<td>.22**</td>
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<tr>
<td>Spirituality</td>
<td>-.15*</td>
<td>.06</td>
<td>-.04</td>
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<tr>
<td>Integrity</td>
<td>.06</td>
<td>.05</td>
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<td>.35**</td>
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<td>Willingness to serve</td>
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<td>Δ R²</td>
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<tr>
<td>Total R²</td>
<td>.44**</td>
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<td>.70**</td>
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</tbody>
</table>
Stakeholder Dialogue as a CSR Decision-Making Strategy: A Qualitative Case Study of Sugar Processing Conglomerate and Sugar Cane Farmers in Thailand

Suwichit (Sean) Chaidaroon, Ph.D.
Division of Public and Promotional Communication
Wee Kim Wee School of Communication and Information
Nanyang Technological University
Singapore 637718
schaidaroon@ntu.edu.sg

ABSTRACT

This paper reports a qualitative case study of a sugar processing conglomerate and sugar cane farmers in Northeastern Thailand to illustrate the challenges that prevent them from engaging in a genuine dialogue with each other. Group discussions with managers and in-depth interviews with sugar cane farmers were conducted. Preliminary data analysis suggests that the company and farmers experienced dialectical challenges in communicating with each other. While both parties hoped to do something “good” for the community and maintain business success at the same time, they struggled to put this ideology into practice. This paper hopes to highlight that negotiating this somewhat opposing ideology and practice would lead to a genuine stakeholder dialogue, which is an essential process in CSR decision-making for an organization.

INTRODUCTION

In recent years, it is almost undeniable that corporate social responsibilities (CSR) have gained interests among business sectors and their stakeholders and CSR has been developed from being a mere business practice to a multi-dimensional faceted concept that academicians have attempted to investigate (Cochran, 2007). Yet, many organizations treat their CSR efforts as a systemic organizational activity in response to social and environmental impact, rather than a process through which moral values and concern are genuinely articulated and negotiated among stakeholders (Maclagan, 1999). This systemic approach may allow organizations to meet fundamental social reporting requirements but it does not lead to a long-term citizenship mentality among corporations (Hess, 2008).

To create a genuine dialogue with stakeholders, van de Kerkhof (2006) argues that all perceived constraints and opportunities must be articulated so that needs and concerns are addressed honestly (Kaptein & van Tulder, 2003). Any deliberation or assumed CSR needs singly from the
organizational perspective does not suffice (van de Kerkhof, 2006) and the organizational motives behind CSR will be scrutinized (Burchell & Cook, 2008).

To reinforce the participatory nature of stakeholder dialogues in CSR decision making (O'Rordan & Fairbrass, 2008), this paper reports a case on perceived discrepancies between a sugar processing conglomerate and sugar cane farmers in Thailand as the company attempted to develop their CSR efforts. Based on the assumption that once the perception gaps are identified a genuine dialogue can be created, the paper uses this case as an illustration to develop a typology of dialectical tensions (Baxter, 1988), or opposing points, in CSR decision making. It is hoped that this framework of dialectical tensions can be taken into consideration by organizations as they conduct stakeholder dialogues to develop their CSR programs in the future.

**RESEARCH METHOD AND DATA COLLECTION**

The present research employed a qualitative case study approach to investigate the interested phenomenon in a real-life setting (Yin, 2009). Among the various uses of case studies, this project studied the bounded phenomenon faced by the selected organization and their stakeholder as an instrumental case to illustrate the ways in which a corporation struggled to develop their CSR efforts by engaging the relevant stakeholder (Stake, 1995). A major sugar processing conglomerate with its more-than-half-a-decade establishment in Thailand was chosen as a case in this study. The site for this project covered the northeastern part of Thailand, the country that was ranked as the sixth largest sugar producer and second largest sugar exporter in the world (Suksawat, Piewthongngam, & Tenglolai, 2008). This sugar company has set up various factories around the region to process sugar and to allow convenience for sugar cane farmers to distribute their canes to the company as transportation could be a major obstacle among them.

Given a fierce competition in the sugar industry in this region, sugar cane farmers had several options to sell their harvest to other companies via several outlets. Therefore, the selected sugar processing company in this study attempted to conduct their CSR programs directed towards sugar cane farmers in order to improve the quality of sugar farming and processing as well as to establish the sense of loyalty among sugar cane farmer to their company at the same time. Their dual goals in CSR activities created some challenges for them to be “good” to the sugar cane communities and to be a successful business enterprise in the region at the same time. Hence this research project studied the CSR efforts of this sugar processing conglomerate and sugar cane farmers as their primary stakeholder in this case to address the following questions:

**RQ1**: How did the sugar cane processing company and sugar cane farmers perceive each other’s roles in their business transactions?
RQ2: What communication challenges in CSR efforts were perceived by the sugar processing company and the sugar cane farmers?

Data were collected through two group discussion sessions with mid and high levels managers of the company to explore past CSR efforts with sugar cane farmers as well as the organizational needs and motivations in developing CSR programs with this group of stakeholders. In addition, eight in-depth interviews were conducted with sugar cane farmers in eight different villages in northeastern part of Thailand. These group discussions and in-depth interviewed were completed during August to October 2010.

Based on the assumption of naturalistic inquiry (Potter, 1996), these participating farmers were purposively selected as they appeared to be opinion leaders who were willing to share their needs and concerns about sugar farming and industry (Frey, Botan, & Kreps, 2000). The analysis was conducted following the grounded theory procedure as interviews and filed notes were transcribed and coded inductively to respond to the research questions. Constant comparison was performed to develop emerging themes until saturation was reached (Strauss & Corbin, 1990).

FINDINGS

Consistent with previous research, both sugar cane farmers and the company indicated explicitly that their relationships would be strengthened if the corporate social responsibility initiatives were mutually beneficial to both parties (Bhattacharya, Korchun, & Sankar, 2009). However, when asked about the discrepancies or challenges in CSR efforts, all participants revealed these challenges subtly through their unmet needs. Specifically, these challenges can be categorized into two dialectical tensions (Baxter, 1988), or opposing points that both parties struggled to balance as they articulated their needs for CSR initiatives.

First, the both parties wrestled with the goal to be successful in their business while becoming a good citizen of the community. As both farmers and the company relied on each other in their business transactions, they hoped to maintain good relationships with each other. However, when asked how they communicated the way they balanced these two goals, company appeared to employ traditional business tactics such as asking farmers to sign written contract when offering certain agricultural assistance to them while the farmers. At the same time, the farmers tended to see the company mainly from their entrepreneurial side and yet still relied on the company for most assistance. These perceptions responded to the first research question regarding their perceived roles. They both hoped to work with each other on an equal partnership basis but their communication appeared to perpetuate the imbalanced roles.
Second, when asked to discuss the previous CSR initiatives they hope to have received and provided, both parties struggled with the balance between material and intellectual assistance. Both parties saw the value in providing material assistance such as fertilizers, insecticides, or irrigation while how-to knowledge in sugar cane farming was also important. However, the way these assistances were presented led to some unintended consequences and misperceptions between the two parties. For example, while the company attempted to provide effective fertilizers and insecticides, farmers expressed their heartened fear for using chemical substances that will affect their health and environment.

**CONCLUSION**

This paper reported preliminary findings of a study to identify communication and role discrepancies between a sugar processing company and sugar cane farmers. Two dialectical themes were identified through qualitative data including (1) balancing business goals and becoming a good community citizen and (2) intellectual and material CSR initiatives. While these two themes are based on data from this sugar cane industry case, they seem useful for other organizations to consider as they engage in a dialogue with stakeholders to make a decision for their CSR initiatives.

**REFERENCES**


Generations Y and Z present intriguing challenges for projects.

Today, people are shared between and across projects and business as usual. People work on several projects at the same time meaning project managers must compete for the attention and ‘effort share’ of each individual.

Project managers, are uniquely placed to leverage this and thereby facilitate project success. Generations Y and Z demand they be the centre of the plan – not the task.

This paper explains an approach, developed and tested through trial, error, thought and research that works for and with Generations Y and Z (and Boomers and X’ers thrive under it as well).

**Keywords:** Generation Y, Project Management, Project Success

**INTRODUCTION**

There is one major contemporary issue facing project management – credibility. All other challenges are sub-ordinate to that single issue. It’s an issue that if not met will see project management potentially relegated to the status of a low-level administrative function. This paper explores why there is a credibility gap, proposes two approaches to address it and focuses on the opportunity presented by Generations Y and Z for updating project management and moving it to the forefront of importance within organisations.

**BACKGROUND**

Project Management as a definable skill and discipline emerged in the mid 1900’s with the purpose of achieving unique outcomes. Since then it has developed into a profession with its own language, rules, associations and accreditations. The management and delivery of projects wasn’t new but the disciplines, processes and procedures were.
These developed from engineering based companies, such as DuPont, presumably, in response to specific problems with individual projects. The development of the domain parallels the history of management of which the basics have been:

Pre 1950’s
- Organizations, whether projects, corporations, government, not-for-profit were established to achieve something (and achievement is the focus)
- Managers had a command and control authority over the people working for them – interestingly, anecdotal evidence suggests projects were successful (on any measure) about 50% of the time
- Increased focus on ‘management’ and planning (Gantt was born)

1960’s and 70’s
- People can be organized mechanistically (scientific management)

1980’s and 90’s
- What you measure gets done (metrics and quality movements)
- Flat structures and reporting lines are most efficient
- Down time is a bad thing (total efficiency will result in effectiveness)
- People can work on many activities within the same timeframe (efficiency)
- Matrix organisations are the most efficient (people can serve two masters)
- Emergence of training and accreditation outside the traditional professions
- People are self-motivated to do what we want them to do when we want them to do it (magical thinking)

2000’s
- More control means less failure – and elimination of fraud (post Enron)
- Increased reporting mitigates failure – or provides forensic defensibility for failure

2011
- By now our sophisticated tools, processes and reporting mean we can determine success on almost any criteria – time, budget, scope, achievement of goals
- However, the people who matter, the people who commissioned the outcome, rarely agree with the project manager’s definition of success
- We can plan, schedule and track to detailed levels
- Project management focuses on tasks not people
- Project management has been sold as a one size fits all capability
- There is a glut of project managers
- People who want outcomes achieved are unclear about the distinction between project managers who focus on administration and those who focus on delivery
- We now have a perceived success rate of around 24% Standish Chaos Report (2010)
- Project management has very low credibility

Project management has evolved into two streams. One focussing on:
- Developing business cases (that often run for hundreds of pages even for small projects)
- Detailed planning, plotting timelines, tasks, interrelationships and budgets
- Putting in place governance structures and reporting templates and schedules

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Negotiating with suppliers and finalising contracts
Reporting slippage and problems and replanning.

The other focussing on:

Driving and delivering outcomes

CREDIBILITY – THE CONTEMPORARY ISSUE

Project Management has a credibility challenge, which, in this author’s opinion, can be addressed by two changes to the way we approach projects and their management:

1. Clarifying the expectation of project managers, by those commissioning projects, as the highest early priority of each project (i.e. are they expecting the outcome or the administration to be the highest priority); and
2. If it’s the outcome, ensuring that is what the project manager actually does rather than relying on administration to deliver (almost as a side effect) the desired outcome.

Some might suggest this is semantics – and perhaps so, but very powerful semantics.

To achieve 1 is relatively simple. All professions have specialisations and it’s time project management acknowledged and addressed the distinction between administrative and driver project managers. The challenge then, is for each project manager to decide whether they want to:

- focus on the administrative process and procedures; or
- focus on driving delivery of the outcome (of course using the tools and meeting the reporting requirements but with an outcome focus).

Then they need to accept only those roles that align with their speciality and the commissioner’s expectation. This simple step will go a long way to improving credibility of the profession.

Addressing challenge 2 provides a rich opportunity to move project management to centre stage. This paper focuses on a method for addressing the challenge of credibility associated with actually driving projects to completion.

Enter Generations Y and Z. These people have grown up through an education system tailored to the individual. They believe they can multitask in all things, they demand constant feedback (and are determined that it should be quality feedback), they want to be challenged and rewarded, they want to know what they are doing matters to the organisation and they have no plans to ‘do their time’ on the way to the top. They are not happy to sit in dead end jobs and they see little value in the experience of older workers. In the course of exploring this, the author was
told by one Gen Y’er “experience could only tell them how things were done yesterday – and that is of no use today” and by another “tell me what you want done and then leave me alone”.

These people present a challenge and an opportunity.

**AN APPROACH**

Using contemporary project, and general management, approaches people are allocated to tasks across one or more projects and business as usual within the same timeframe.

*Contemporary Project Plans*

Most people recognise the following standard example of a project or program plan. It provides for a single outcome, with tasks as the organisation anchor, and allocation of people secondary.

![Contemporary Project Plan](image)

**Figure 1: Contemporary Project Plan**

The inevitable unintended consequences are:

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Managers and project managers have a view of the resource allocation on their project or area of responsibility – but not on the tasks and assignments competing for the ‘effort share’ of the individual.

Allocation of tasks and assignments is often made in isolation of the allocations being made by other projects and business as usual.

Individuals have work allocated from several sources.

Individuals have no single view of what is required of them, on whom they are depending on and who is depending on them.

Individuals must aggregate the information provided to them as best they can.

By default, individuals have the power to decide what they work on and when, and thereby which projects and tasks are advanced.

Project and line managers have become increasingly passive in this environment.

The project management can be terrific yet the project fails. Project and line managers alike point to resourcing constraints as the issue.

Generations Y and Z are deciding what to work on according to what interests them, what will do their career the most good and who they like working with.

One manager reported “I’m out of touch with what work is going on where, I don’t have an overall view if who is working on what, I just have to hope its all ok”.

Contemporary next steps

As with most things when we think about them, it becomes clear there needs to be an improved approach. We are fortunate; Generations Y and Z have come along with their differing expectations and requirements. We can either continue to insist we approach projects with tasks as the central focus or we can adapt and move to a view where the individual is the central focus.

The next step isn’t such a big one. Football teams, surgical teams and playwrights have understood this forever. Plan the ‘play’ but execute with the people.

For a project manager, it means taking the existing project plan and simply going the next step. Turning it into something people can understand, assimilate and follow.
This can be integrated with projects, programs and business as usual providing a complete resource centric view of who has to do what and when.

**Positive consequences**

While the aim of this view is to make it clear what each person is working on and when, some positive consequences have become evident and these transcend generation, culture, geography, domain expertise:

- No one wants to be the weak link or seen as not holding their end up. With this view it is very clear who has to do what and who is depending on each person to complete their work
- People dependent on prerequisite work become more interested in what the people they are depending on are doing and call out obstacles and challenges far earlier than when using the contemporary views of allocations
- Management have an integrated view of resource allocation and can empirically determine who is over allocated (as against the relatively meaningless use of percentage allocated reporting)
- Individual work allocations can be assessed to determine whether the work being asked of an individual is realistic in combination – even if there isn’t an over allocation. For e.g. if it becomes clear that an engineer is being asked to create at the same time as build it might be necessary to extend the time allocated or reallocate one of the tasks.

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• Progress can be monitored on a done/not done basis rather than the very subjective percentage complete in common use
• Consequences on other projects, programs and portfolios can be assessed as soon as any single activity is missed
• Senior management has additional information to use when assessing project, program and portfolio progress
• Generations Y and Z are happy, they know what is required of them and when, and they know where they fit in to the overall agenda of the organisation.

Best of all project management can now drive actual outcomes. Through that, project management becomes as integral to managing an organisation as finance already is and it regains its credibility.
Organizational Trust, Monitoring, Effort and Performance: 
An Investigation of Construct Relationships using Mixed Methods Design in 
Virtual Teams

Christina B. Steele
Colorado Technical University
2221 Cooper Trail
Canon City, CO 81212
e-mail: steele.christina@ymail.com

ABSTRACT

Applying Creswell (2009), Edmondson & McManus (2007), Creswell & Plano Clark (2011) and 
Martins, et al. (2004) this paper offers a mixed methods approach to study how trust affects 
virtual teambuilding outcomes. Specifically, this paper examines the need for an explanatory sequential study in this area, which may be addressed by a quantitative analysis and qualitative exploratory study of trust and group outcomes in long-term Virtual Teams (VTs).

INTRODUCTION

The Research Problem

In a comprehensive empirical analysis, Martins, et al (2004) found that many aspects of virtual team functioning remains unexamined, and therefore, further research on the role of trust in virtual teambuilding is warranted. Additionally, they assert that there is a need to explore trust as an interpersonal process, and how the role of trust affects the long-term group outcomes in virtual teams. In line with this assessment, trust, interpersonal processes, and shared understandings continue as one of the greatest challenges of virtual teams (e.g. Gibson & Manuel, 2003; Jarvenpaa & Leidner, 1999; Maznevski & Chudoba, 2000). Consequently, further empirical research is needed, for more context-specific theories on the role of trust. Prior research findings suggest that the impact of trust in the outcomes of long-term teams is different from short-term teams. These studies also show that their results are generalizable to how trust affects virtual team performance (Martins, et al, 2004; Jarvenpaa, et al., 1998; De Jong & Elfring, 2010). Hence, the fundamental hypothesis of this exploratory study is that trust promotes long term performance in Virtual Teams. Consequently, successful Virtual Team performance outcomes are benefited through trust building brought about through increased levels of effort and monitoring. Thus, the problem to be resolved is: How does the role of trust positively affect long term group performance in virtual teams? The purpose of this study will be to first to determine if the trust and virtual team performance relationship can be explained with the moderating effects of monitoring and effort using a quantitative analysis. Secondly, this study
seeks to increase the understanding of these constructs and their associations using qualitative techniques.

**Past Research**

The past research in this area of interest can be grouped into three main categories. 1) The role of trust in face-to-face teams; 2) The positive affects of trust on long-term group performance; and 3) the constructs in virtual teams. Virtual team research is fairly new. Most of the prior research in this area has focused on applying the findings from traditional teams to the virtual environment (Kirkman & Mathieu, 2005; Martins, et al, 2004; Marks, et al, 2001). The majority of literature has focused on the short-term affect of trust. The current theories are limited to small sample environments (Cohen, & Gibson, 2003; De Jong & Elfring, 2010). Lastly, a large part of the research has been focused on correlation and does not study all the variables in relation to each other (Gibson & Manuel, 2003; Martins, et al, 2004; Jarvenpaa, et al, 1998).

**Deficiencies and Need for Mixed Methods to Address Deficiencies**

With the pervasiveness and ubiquitous nature of technology in the current day and age, virtual teams are becoming a prevalent organizational construct. However, many of studies are relatively new, and lack cohesiveness among their theories. One of the first issues that Martins, et al (2004) chose to identify is “what is a virtual team?” While several characteristics/traits have been discussed the two most widely adopted features are 1) geographic dispersion and 2) use of electronic communications (Cohen & Gibson, 2003; Griffith, et al. 2003; Martins, et al. 2004; and Kirkman & Mathieu, 2005). This is important to understand the disagreement among scholars on what makes a virtual team, since this is one reason that much of the literature is disparate. Martins, et al. (2004) takes an integrative approach in defining virtual teams “as teams whose members use technology to varying degrees in working across locational, temporal, and relational boundaries to accomplish an interdependent task” (pg. 808). Using this definition of virtual teams, we are able to explore the affective content of this trust.

Given this definition, Martins et al. (2004) suggests that many aspects of VT functioning remain unexamined. Most of this research has been done on uninhibited behaviors with face-to-face teams on the premise that the results are generalizable, and therefore, applicable to VTs. In other words, the outcomes of trusting relationships within VTs appear to be similar to those evidenced in traditional teams (Driscoll, 1978).

Trust, has been studied extensively within the construct of traditional teams’ literature, and has been shown to be a determining feature in team effectiveness (Martins, et al. 2004). Additionally, it has been noted that trust is a key factor in virtual teams (e.g., Handy, 1995; Jarvenpaa, et al., 1998; Sarker, et al., 2003), due to the ability of trust to minimize the adverse impact that geographic distribution can have on psychological intimacy (Warkentin & Beranek, 1999; Walther, 1994). Therefore, trust has been described as the “glue of the global workspace” (O’Hara-Devereaux & Johansen, 1994: 243). Some of the determining factors in establishing trust in VTs has been studied by various researchers to examine how time (Walther, 1995; Walther & Burgoon, 1992), communication intensity, and the ability to cope with technical and
task uncertainty (Ratcheva & Vyakarnam, 2001) relate to the affective outcomes (Martins, et al. 2004). In support of these findings, several attributes of team communication have been found to facilitate the formation of trust within VTs (Jarvenpaa & Leidner, 1999). Furthermore, Martins, et al. (2004) state as part of their findings:

“It has also been suggested that a face-to-face meeting during the initial “courtship” period of a VT’s life cycle helps develop trust in the team (Coutu, 1998; Suchan & Hayzak, 2001). Interestingly, while high and low performing VTs may start with the same levels of trust, the high performers appear to be better able to develop and maintain high levels of trust throughout their project (Kanawattanachai & Yoo, 2002). A shared group identity has been suggested as critical to the effective functioning of teams due to its impact on cooperation, commitment to decisions, and levels of trust (Kramer & Brewer, 1986). Identification may be of even greater significance within VTs particularly when the teams anticipate working together in the future (Walther, 1997)” (pg. 816).

Therefore, in light of the above findings, Martins et al. (2004), assert that further research is needed to address the major gaps which exist in the literature on the interpersonal processes related to long-term group outcomes. Specifically, the role of trust in virtual teams remains an area in which there is room for extensive future research.

This study focuses on two team-level processes: team monitoring, and team effort, as examined by De Jong and Elfring (2010). They were able to establish how these processes act as mediating mechanisms that together transmit the effects of trust to performance. However, they did their analysis in a face-to-face environment. I propose to study these constructs in a virtual team environment. Past studies on the mediated effects of trust have tended to focus on only one of these processes as a variable. Therefore, De Jong and Elfring’s (2010) examination of the mediating role of multiple team processes has provided a complete review and has also allowed for integrating and testing alternative theories on how trust affects performance (Mathieu, et al., 2008). In order to evaluate the affective outcomes of virtual teams, we must consider the link between processes (classified as planning, action, and interpersonal processes (Marks, et al, 2001) and group outcomes.

This study seeks to address these deficiencies with a quantitative analysis on two team-level processes: team monitoring, and team effort, to establish how these processes act as mediating mechanisms that together transmit the effects of trust to performance in virtual teams. Secondly, the qualitative analysis will address these deficiencies by helping to further understand the perception of the role of trust in virtual teams, by building a rich, detailed description of the role of trust in the virtual team environment (Creswell, 2009, p. 64)

Audience

This study will be particularly useful to businesses and organizations interested in the organizational and management uses of virtual team technology. Academics interested in Virtual Teams and collaboration with relation to productivity, may also find this research of interest. As organizations continue to globalize and adopt technology (Warkentin & Beranek, 1999), the use
of and need for virtual teams is increasing. Therefore, this research will be of particular interest to organizations, virtual team leaders, supervisors, and virtual employees, as well as, academic researchers interested in what makes virtual teams more efficient. The results of this study will add to the groundwork of research on the role of trust and how it is related to productivity in a virtual environment. The study also provides insight into how trust is related to monitoring and effort in virtual teams.

PURPOSE

Purpose and Reasoning for Mixed Methods Design

The purpose of this study will be to first to determine if the trust and virtual team performance relationship can be explained with the moderating effects of monitoring and effort using a quantitative analysis. Secondly, this study seeks to increase the understanding of these constructs and their associations using qualitative techniques. The qualitative portion of this study will be to explore the ways in which trust is perceived in virtual teams, in order to examine the role trust plays in virtual team outcomes (Creswell, 2009, p. 112) I want to be able to further understand the perception of the role of trust in virtual teams, and build a rich, detailed description of the role of trust in the virtual team environment (Creswell, 2009, p. 64) A mixed methods design best fits this project since I am first trying to prove that there is a relationship among construct, then explore the perception of the constructs. Researchers have been conducting mixed methods research for several decades, and referring to it as multi-method, integrated, hybrid, combined, and mixed methodology research (Creswell and Plano Clark 2007: 6). The reasoning for utilizing these designs are varied, but they can be generally described as methods to expand the scope or breadth of research to offset the weaknesses of either approach alone (as cited in Driscoll, et al, 2007). Using this basis and methodological fit from Edmonson and McManus, a mixed methods approach is the best design to approach this project. This is due to the fact that the research in this area could be considered intermediate, and therefore will draw upon prior work (trust in traditional teams), and propose new theoretical relationships (virtual teams). In which, the integration of quantitative and qualitative data will help to establish the external and construct validity of the new measures (Edmondson and McManus, 2007, p. 1165).

The Research Question and Hypotheses

In order to address the questions: how does the role of trust positively affect long term group performance in virtual teams? The following quantitative analysis will be conducted with the following hypotheses.

Relation of Independent and Dependant Variables in Quantitative Design

H1: Monitoring among virtual teammates partially mediates the positive relationship between trust and performance.

H2: Effort of virtual teammates partially mediates the positive relationship between trust and performance.

H3: Trust promotes long term performance in Virtual Teams. Successful VT performance is a benefit of trust, brought about with increased levels of effort and monitoring.
After exploring if the trust and virtual team performance relationship can be explained with the moderating effects of monitoring and effort using a quantitative analysis, this study seeks to increase the understanding of these constructs and their associations using qualitative techniques.

**Philosophical Foundations**

This type of study assumes that collecting diverse types of data will provide the best understanding of the research problem. This mixed methods approach, is in line with a pragmatic philosophical foundation, in which the design will be flexible and support the procedures of research that best fits the purpose of this study (Creswell, 2009). In this mixed methods approach, the first quantitative phase will be influenced from the post positivist worldview; then, when moving into the qualitative phase, a more constructivist approach is taken. For this type of an explanatory design, it is important to understand that the overall philosophical assumptions will change and shift to suit the design method used (Creswell & Plano Clark, 2011, p. 83). The theory of trust affects on long-term group outcomes in Virtual Teams is drawn from Dirks and Ferrin’s (2001) moderation model of the role of trust in organizational settings and De Jong and Elfring’s (2010) findings on the mediating roles of trust and performance. The moderation model suggests that trust does not directly elicit any particular behavioral outcomes, but influences how people interpret or evaluate information related to attitudes and behavior. Dirks and Ferrin (2001) identify two explanations for the moderation effect: (1) “trust affects how one *assesses the future behavior* of another party with whom one is interdependent (or who may take action that affects oneself),” and (2) “trust also affects how one *interprets the past (or present) actions* of the other party, and the motives underlying the actions” (p. 456, italics original, as cited in Jarvenpaa, et al., 2004).

Specifically, the interpersonal processes, defined by Martins et al. (2004) as referring to relationships among group members, to include tone of interaction, trust, cohesion, affect, and social integration, will be the specific focus area for examining virtual team outcomes in the with relation to the role of trust and the moderating effects of the variables of monitoring and effort (De Jong & Elfring, 2010). Furthermore, Martins, et al. (2004) used the inputs-processes outcomes (I-P-O) framework from Hackman & Morris, (1975), as their theoretical lens. This model has been the prevalent model applied to team studies in order to understand the factors in team leadership (Marks, et al., 2001) and successful completion of team processes (Fedor, et al., 2003). Using the I-P-O framework as a theoretical lens, Martins, et al. (2004) were able to evaluate the current state of literature.

**LITERATURE REVIEW**

**Quantitative**

In a study in pertaining to social presence theory and virtual teamwork by Warkentin & Beranek (1999), it was found that groups which were given appropriate training exhibited better awareness of the interaction over time, particularly with trust, commitment and open communication between team members (pg. 286). The study identifies several areas for further investigation to include the analysis of the trust, common goals and openness variables. As well
As, the effects of trust development on task focus, task completion and management of uncertainty.

As a way to identify the role of trust, social capital studies have emerged. Trust is identified as a relational dimension of virtual environments. Zornoza, Orengo & Peñarroja (2009) investigated the relationship between “virtuality level (based on the characteristics of the technology used by each group) and three team-effectiveness criteria (group performance, group process satisfaction and group cohesion) as moderated by group trust climate or relational capital (i.e. trust perceptions shared by team members)”. In their study of 66 teams, they were able to conclude that group trust climate moderates the relationship between the virtuality level and group process satisfaction and group cohesion when the virtuality level is high. Therefore, these results evidence that relational capital plays an important role in the effectiveness of virtual teams (Zornoza, et al. 2009).

**Qualitative**

Chidambaram (1996) studied how group attitudes and outcomes change with time and repeated use of a group support system. Using the argument that relational intimacy may take longer to develop in computer-supported groups (Social Information Processing (SiP) theory) he tested a temporally bounded model of group behavior. The premise of this study was that virtual teams, in the form of computer-supported groups, given time, will exchange enough personal social information in order to develop strong relational links. Consequently, Chidambaram (1996) asserts that over a period of time, limitations of group interactions dissipate and users attitudes will change from negative to positive; and outcomes improved more slowly. Therefore, his study was able to address the attitude changes of users, to support the SIP perspective that repeated use of computer support can help groups connect. Specifically, this study addressed the issue of how intragroup relational links evolve over time. Additionally, this study challenges the assumption that “computer support increases task focus and simultaneously minimizes socioemotional interaction” (pg. 143).

Mathieu partnered with Gilson & Ruddy in 2006, to expand upon this model and their survey data (collected from 452 members of 121 empowered service technician teams, along with archival quantitative performance and customer satisfaction criteria), they were able to test the expanded model using structural equation modeling techniques. Additionally, the I-P-O model (Hackman & Morris, 1975) provides the following descriptions: **Inputs** represent starting conditions of a group, the design and compositional characteristics of a team that influence how teams operate and perform. **Processes** represent dynamic interactions among team members as they work on common objectives. **Outcomes** represent the consequences of a team’s functioning (Martins et al. 2004).

In order to evaluate the affective outcomes of virtual teams, we must consider the link between processes (classified as planning, action, and interpersonal processes (Marks, et al., 2001) and long term group outcomes. Specifically, the interpersonal processes, defined by Martins et al. (2004) as referring to relationships among group members, to include tone of interaction, trust, cohesion, affect, and social integration, will be the specific focus area for examining virtual team outcomes in the with relation to trust.
Walters studied the trust in the virtual environment using a mixed methods approach to show that a strong relationship exists between trust and perceived team effectiveness. The study included 100 virtual team members at a large Midwestern firm. A correlating mixed method was used which included a modified Virtual Team Trust instrument (Sarker, et al., 2003) and a measure of team effectiveness (Lurey & Raisinghani, 2001). Open-ended survey items were also used to gather qualitative data related to the factors that foster team trust and those that damage team trust. Cognitive based trust was found to have a stronger relationship to perceived team effectiveness as compared to institutional and personality based trust. Findings from this study suggest that cognitive based trust may be a key factor in developing effective virtual teams. Recommendations for increasing trust in virtual teams include supporting the communication of the status of tasks and task completion; defining the frequency and processes for communication; following up for clarification; asking questions when needed; encouraging active listening; and matching the message to the communication method in virtual communications (as cited in Walters, 2004).

METHODS

Definition of Mixed Methods Research

For the purposes of this study, the definition of mixed methods research as proposed by Creswell and Plano Clark (2011) will be used as a foundation of the design method. They define these designs as “those that include at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words), where neither type of methods is inherently linked to any particular inquiry paradigm (p. 256)

Design Type and Definition

Many of the mixed methods design approaches are sequential. To further clarify the specific two-phase approach, Creswell and Plano Clark (2011) offer the specific method of “the explanatory sequential design” (p. 81). This design approach begins quantitatively and follows up on specific results with a second qualitative phase. The purpose of the second phase is to explain the initial results in more depth, hence, the term explanatory sequential design (p. 82). The reason this design type is best suited for this study is that this study seeks to assess the relationships with the quantitative data (trust, monitoring, effort and performance); but also to be able to explain the mechanism or reasons behind the resulting trends (p. 82).

Challenges in Explanatory Design

One of the challenges with this mixed method approach is the time involved in implementing the two phases (Creswell and Plano Clark, 2011, p. 85). The qualitative phase will require more time, therefore, the timeline for this study will budget 1/3 for the first phase and 2/3 for the second qualitative phase. It is also challenging to get IRB approval in this approach due to the lack of specificity in the participant selection for the qualitative phase. This challenge will be addressed through tentatively framing the second phase for the IRB, and informing the participants that they may be contacted again (p. 186-187).
Examples of Explanatory Design

Igo et al. (2006), utilized the explanatory design method in their study on the effect of different modes of note taking on test performance for middle school students with learning disabilities. They placed priority on the initial quantitative phase, the results of this phase were then used to conduct a qualitative phase that included gathering interviews and documents from the students to understand their note taking attitudes and behaviors to help explain their phase one findings (as cited in Creswell & Plano Clark, 2011, p. 85).

Causal Graphic Model

Trust as illustrated as $X_1$ will have a causal effect on the intervening variables of Effort $Y_1$ and Monitoring $Y_2$ resulting in Performance $Z_1$.

Furthermore, it is theorized that there is also a direct positive relationship of trust on performance. As, trust ($X_1$) increases so does performance ($Z_1$); furthermore, it is theorized that effort increases ($Y_1$) that monitoring decreases ($Y_2$).

Quantitative Data Collection and Analysis

Creswell and Plano Clark’s (2011) basic procedures in implementing and explanatory design will be followed to design this study. In such, step 1 consists of designing and implementing the Quantitative Strand (p. 84). Creswell (2009) defines theory as “an interrelated set of constructs (variables) formed into propositions, or hypotheses, that specify the relationship among variables” (p.51). Using this definition the first main construct in this study will be trust (independent variable). Zornoza, et al. (2009) found that group trust climate moderates the relationship between the virtuality level and group process satisfaction and group cohesion and showed that relational capital plays an important role in the effectiveness of virtual teams.
Furthermore, the second constructs will are monitoring and effort (intervening variables), as they mediate the effects of trust on the dependent variable (Creswell, pp. 50, 151). De Jong and Elfring (2010), used an analysis of long-term teams, to support the mediated effects of trust via team monitoring and team effort. Additionally, their findings contribute to understanding how trust operates within ongoing teams in a way that is distinct from what is known from studies of short-term teams (p. 535). Therefore, since trust acts as the moderator, the last construct will be team outcomes, specifically, the outcome of performance (dependent variable). Mathieu et al. (2006) established that “team processes serve to mediate the influence of team empowerment on team outcomes” (pg. 97). This is an important foundation for this study, due to the proportional link between trust and group outcomes.

**Qualitative Data Collection and Analyses**

The qualitative strand will be designed from step 2 of the explanatory design. From the quantitative results I will determine what results or differences will need to be explained. I will then refine the qualitative questions and determine what participants from the quantitative study will be selected for participation in the qualitative phase. To design the qualitative strand, I will state the research questions that follow the results from step 1 and determine the approach. Then, I will obtain permissions; and purposefully select a qualitative sample that can help explain my results from step 1. To collect my data in this phase, I will use open-ended questions with protocols informed by the results in step 1. Then the data will be analyzed using procedures of theme development and those specific to the qualitative approach to answer the research questions (Creswell & Plano Clark, 2011, p. 84).

**Mixed Methods Data Analysis Procedures**

The data collection procedures in this study will be based on the explanatory design method as outlined by Creswell and Plano Clark (2010). In this design, the quantitative data is first collected, analyzed and then the results are used to inform the follow-up qualitative data collection. Consequently, the sampling will occur at two points in the design: 1) a quantitative phase, and 2) a qualitative phase. The collections will be related to each other, and the one builds on the other (p. 185). In the explanatory sequential design method, the last step of data analysis is to interpret the connected results (Creswell & Plano Clark, 2011). To carry out this mixed methods procedure, I will summarize and interpret the quantitative results; summarize and interpret the qualitative results; and lastly, discuss to what extent and in what ways the qualitative results help to explain the quantitative results (p. 84).

**CONCLUSION**

All three approaches to research, quantitative, qualitative, and mixed methods have merit. Each with their own strengths and weaknesses, while a mixed methods approach, like the one proposed in this paper, may be the most logical choice in which to explore this research topic; it
is important to understand the philosophical considerations which have influenced this choice (Creswell, 2009, p 6). It is helpful when considering why a particular research type is selected by how each of these paradigms influences the practice of research differently. When considered along with Edmondson & MacManus’ (2007) proposition of “three archetypes of methodological fit in field research” (p 1160), a research method which fits one of the three archetypes: nascent, intermediate or mature as a state of research and theory in a given field (Edmondson & McManus, 2007), can be used to develop an appropriate methodological fit. Creswell and Plano Clark’s mixed methods model can then be utilized to further justify the methodological fit and improve the connection of purpose with practice with the method of inquiry. Overall, the most important consideration when choosing a research design is that all of these elements support each other. In this example, the most appropriate method of inquiry in a research state which is “intermediate” in the Edmondson & McManus framework, is an incorporation of both qualitative and quantitative data in a mixed methods design. Creswell and Plano Clark identify that the different types of mixed methods designs include specific types of decisions and issues for the data collection procedures (p. 180). To conduct a strongly convincing study, all the theoretical approaches should be complementary and strengthen the justification for the approach (philosophy, state of research, and status of inquiry).

Therefore, based on all that I have learned through this process, I believe that the mixed methods approach appears to be the best fit for me and my research topic. A mixed methods design is appropriate for this research since the concept of trust in virtual teams is emerging. The research is focused on the exploration of theoretical propositions, the availability of groups of well established theory that influence the research (constructivism, advocacy/participatory, and pragmatism) Creswell, (2009), and requires the incorporation of various data categories and multiple analysis (Edmondson& McManus, 2007). Further, the relationship between the qualitative and quantitative models can be to help relate the philosophical theory to the practical methods in which a research method is justified. The reason this design type is best suited for this study is that trust as an interpersonal process needs to be shown to have an affect on virtual team performance. This study seeks to assess the relationships with the quantitative data (trust, monitoring, effort and performance); but also to be able to explain the mechanism or reasons behind the resulting trends (Creswell & Plano Clark, 2011, p. 82).

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Understanding Interpersonal Dynamics in Project Team Management: 
A Managerial & Theoretical Perspective

David Wilemon, PhD
Emeritus Professor of Innovation Management
Whitman School of Management
Syracuse University
dwilemon@syr.edu

ABSTRACT

In the last two decades important gains have been made in our knowledge of project management. Much of this knowledge has focused on creating better tools to plan, execute, and control projects. There are, however, other important determinants of project success. Three areas which have received far less attention are how project leaders can gain support for their projects via their interpersonal power & influence; how to deal with those who can either block or help facilitate project accomplishment; and how to “manage upwards,” e.g., managing key relationships with project sponsors and senior management. This paper presents an integrated view of the challenges project managers face in dealing with these issues.

Keywords: Project leadership, project management politics, team leadership, senior management relationships, project teams

INTRODUCTION

Contemporary project managers need to have a keen understanding of the role of power & politics, and how these concepts relate to performance. Many project managers operate in environments where they do not control many of the people that contribute to their success. Thus, to garner and maintain support, project leaders need to understand how to effectively use their power & influence.

This paper develops a framework to help explain what we know about the role of power & influence in project management. Relying on research studies conducted by the author and his colleagues, as well as the research of others, the fundamental sources of power & influence will be identified and discussed. Two major project leader styles will be discussed and how they can be effectively used in different project contexts.

In the context of project work & performance, politics does not necessarily imply negative actions. Rather, politics can refer to the positive behavior of keeping people interested in and informed about the project and making sure the necessary support and resources are available for
a project. Several examples will be given of positive political actions; methods for exercising upward influence; and the challenges & consequences encountered when political action is exercised. It is important to note that power & political actions are often tempered and shaped by the cultural environment within which project managers operate. Several implications for project leaders and those who manage them will be advanced throughout the paper [Thamhain and Wilemon, 1999, Lewis 2007].

**PROJECT MANAGERS INFLUENCE STRATEGIES**

One of the earliest research studies undertaken by the author and his colleagues involved an examination of how project leaders gain support for their projects. Using the theoretical framework of French and Raven [French and Raven, 1959] and our empirical studies [Gemmill and Wilemon, 1970, Wilemon and Cicero, 1970, Thamhain and Gemmill, 1974, Thamhain and Wilemon, 1974], we found five major sources of influence were used in gaining project support. A brief examination of each of these power sources follows:

2.1 Authority

This implies the “formal authority” that a project leader has been granted. It can be an important source of influence. We define authority as the ability to gain support because project participants believe the project leader has the authority to issue commands & directives [Thamhain and Wilemon, 1974]. This “formal” authority comes from the organization. As one project management observer noted, “A project leader has as much authority as others think he/she does.” When people work with a project leader over an extended period their observations about the amount of authority a PM has will be tested and observed. In working with a number of PMs, I have often observed that the more inexperienced PMs often “over value” the role of authority in garnering support. This usually occurs when project leaders are not fully aware of the full spectrum of their power/influence sources.

2.2 Reward Power

This power/influence source is defined as the ability to gain support because project participants value the rewards they believe the PM is capable of dispensing [Gemmill and Wilemon, 1970]. Examples of rewards include: 1) ability to promote, 2) ability to influence salary increases, 3) ability to grant recognition, 4) assigning interesting work, 4) ability to help one achieve positive visibility, & 5) offering learning/development/experience opportunities.

It is important to note that a PM has two broad types of reward power. The first is called “direct rewards” which is what the PM is officially empowered to grant to others. The second type is “indirect rewards” implying one can “influence” but may not be able to grant a reward directly. For example, if a PM puts in a good word about a project participant to that team member’s functional manager, that is an exercise of indirect reward power. Matrix managers, for example, often use indirect rewards to gain support, as they are often deficient in direct rewards. Most
PMs often have a larger “reward portfolio” than they initially think they have. It is also common for a PM to have limited formal authority but high degrees of indirect reward power.

2.3 Punishment Power

Punishment power is the ability to block or withhold rewards that project participant’s desire. In our experiences, effective PMs seldom use this power base. Why? If they are effective, they have developed ways to deal with people issues and they know how to gain support. Further, if a PM overuses punishments in order to gain support it will have a negative impact on the project. Individuals are often reluctant to join a project if the leader is one who over emphasizes punishments as a motivator. However, there are situations where corrective action needs to be taken in order to complete a project in a timely manner. A project team member who is highly disruptive to the team needs to be given feedback & possibly a reprimand. In some cases, that team member who is not functioning effectively may be asked to leave the team.

2.4 Expert Power

Expert power is defined as the ability to gain support because project participants respect the PM’s knowledge and expertise. It is important to note that there are two types of expert power. One type comes from the technical knowledge the PM brings to a particular project. For example, a PM running a project, which is developing electronic components, may be respected for his/her knowledge of electronics and electronic subsystems. The other type of expert power comes from the PM’s general management capabilities. The ability to develop cross-functional teams, handle conflicts, garner support, deal with customers, etc. is examples of managerial expertise. Some observers of project leaders have described an effective project leader as resembling a “T”. The horizontal part of the “T” comes from a project leader’s broad managerial capabilities while the vertical part of the “T” comes from technical expertise.

2.5 Referent Power

Referent power is the ability to attract support for a project because others identify with the personality of the PM. The more one values a relationship with another the more influence that can be exerted. The attractiveness of the project also is a major source of referent power. This influence source is also called project identification. If a PM is running an extremely interesting project that will help shape the future of the organization, the PM will likely gain power because others want to be part of such an exciting project. This power base is particularly useful when dealing with several disparate support groups as well as direct project team members. A final source of referent power is the personality of the PM. If a PM has a pleasing personality, can get along with a wide-variety of people, and is attentive to people, the more likely this PM will attract the support of others.
PROJECT LEADERSHIP STYLES

In our research studies, we found that there are two major leadership styles frequently used by PMs. For simplicity, we call these System I and System II leadership styles. Each style is examined below:

System I Leadership Style

This influence style is based primarily on the PMs use of formal authority, reward power, and punishment power [Gemmell and Wilemon, 1970]. These power bases are derived from the organization and have been granted to the PM. The environment where one is most likely to see this style enacted in the more structured projects, e.g., civil engineering projects, military projects, and in a command & control organizational culture. In these types of organizations, project participants are more likely to expect an authority-based approach to project leadership. Most “heavy-weight” PMs use a System I leadership style.

System II Leadership Style

This influence style is largely based on the expertise of the project leader and his/her referent power. Keep in mind that expertise refers to the managerial and technical qualifications of the PM. This power style is most likely to be seen in flatter organizations and in those organizations which rely on matrix management organization designs. A System II style is largely derived from the PM’s experiences and capabilities. Again, this approach is more likely to be effective in less structured project environments. We often see the System II style used by matrix managers, product managers, integration managers, and IT implementation managers. As a general rule, the System II leadership approach is especially useful for “boundary spanning” project leaders & coordinators.

It is important to note that even though each leadership style emphasizes different power sources, a PM may use all power sources in gaining and maintaining project support.

Power Diagnostic Instrument

There is no one way to assess which power sources will be most effective in different project management situations. However, the following diagnostic instrument can be helpful in assessing one’s environment, one’s power sources and its impact on others. Project leaders should answer the following questions as they apply to their own specific project environments:

- What is the context/organizational environment for the project? Is the organization use to clearly delineated lines of authority? Are roles clear?
- Are processes for managing projects clear & used?
What leadership styles tend to work best in this organization?

What is the relationship of the PM to senior management/sponsors/customers? How credible is the PM to each major stakeholder group?

How important is this project to the organization?
How much experience does the organization have in “managing projects?”

How much freedom do project managers have in planning & executing their projects?
How much formal authority has been granted to the project manager?

What direct or formal rewards is the project leader capable of dispensing? In general, do project participants value these rewards?

What indirect rewards appear meaningful to project team participants?

What rewards can the project leader withhold?

What is the background & experience of the project manager? How successful has he/she been in managing other projects? How do others perceive the PM?

What skills are particularly important to this project—managerial, technical, or some combination?

How attractive is this project to project team members? Is it perceived as a career plus, neutral to career advancement, or a negative to one’s career?

Does the PM have the ability to deal effectively with a wide variety of project participants? Answers to these questions can help PMs better understand the power dynamics in his/her organization. Moreover, this diagnostic can give insights into these power sources most likely to be effective in a specific project situation. In understanding the significance of power relationships, it is always important to understand one’s relationship with each individual on the team and in the environment or context within which this relationship occurs [Baker and Wilemon, 1977 & Berkun, S. 2008]. Differently stated, how one deals with each individual can mean the difference between successful and unsuccessful project performance.

POLITICAL STRATEGIES FOR MANAGING CHANGE

The life of a PM is characterized by constant change [Roberto, 2005]. There are changes in requirements, engineering changes, changes in project scope. Equally important, there is often
the task of dealing with those who might oppose the project and erect barriers in its path. Peter Block offers a useful framework for understanding and managing political relationships which we have adapted for project-oriented work environments [Block, 1987]. Picture a 2x2 matrix containing four quadrants [Block, 1987]. The vertical axis measures the “agreement” others have with your project. This scale runs from low to high. On the horizontal axis, there is a scale signifying “trust” ranging from low to high. This is the level of trust between the PM and other individuals/groups. Block also notes that there are five major types of people/groups managers must deal with in managing change. He notes the following types, which require skillful political management by astute project leaders [Block, 1987].

**Allies—High Agreement/High Trust**

These are the people who believe in our projects (agree with) and there is a high degree of mutual trust with them. We can count on them for support and they often are willing to “go to bat” for our projects. What is important here is to make certain that the bond with allies is strong and enduring. Allies help “empower” our projects by their support. Allies also often help give us the confidence to move our projects forward. It is important to keep allies on your side. Involvement, communicating, and sharing your ideas and strategies with allies is helpful. As noted, it can be an effective strategy to consider allies as one’s extended team. Allies want you & your project team to succeed and they are apt to help you do so.

**Opponents—High Trust/Low Agreement**

There is trust with opponents but they disagree with our project’s goals, objectives, purpose, and/or direction. Opponents can make PMs think carefully through their goals and objectives. Opponents also can be useful sounding boards in the early planning phases of a project. The more credible and powerful an opponent is, the more we need to attend to their concerns about the project. With opponents, it can be helpful to clearly identify where you agree and disagree. When areas of agreement are identified, work can proceed. Frequently a project can move ahead even though our opponents disagree with some elements of our project. Anticipating potential objections also is a useful strategy in dealing with opponents.

**Bedfellows—High Agreement/Low Trust**

Bedfellows are in agreement with our project goals but there is a low level of trust with bedfellows. PMs need to be mindful when dealing with bedfellows. PMs can often work with bedfellows if agreements on project issues are clearly discussed and follow-up maintained. PMs may be able to change a bedfellow into an ally if he/she can develop a successful relationship with them. As agreements are made and carried out, the degree of trust is likely to improve with bedfellows. Since bedfellows agree with our goals this helps move the project forward even though the trust level can be low. In order not to jeopardize agreement on project goals it is important not to do anything that might further degrade the level of trust. By focusing on areas of agreement and discussing progress, PMs can usually move their projects forward. Problems
develop when bedfellows find reason to disagree with project goals, thus it is important to keep bedfellows abreast of those project developments which impact them.

Fence Sitters—Low Trust/Unknown Agreement

Fence sitters do not take a stand for or against our projects [Block, 1987]. As one PM noted, “After a meeting with my major fence sitter I never quite know where he stands on key issues.” Block notes that fence sitters can be very polished individuals and they usually have good verbal skills. Dealing with fence sitters can be a frustrating experience experienced even for the most seasoned PM. It can be a useful strategy to confront fence sitters and ask them specifically where they stand on key project issues. Once a PM knows where they stand, we are then in a better position to move forward. An unproductive approach with fence sitters is to do nothing via a passive management approach. A PM’s assertiveness and willingness to confront can be especially productive in dealing with fence sitters.

Adversaries—Low Agreement/Low Trust

People become adversaries when PMs have not been able to negotiate agreement or trust [Block, 1987]. They consume a lot of “psychological energy.” A strong adversary can make life difficult for even the most experienced of PMs. Dealing with adversaries is one of the more difficult challenges PMs are likely to face in carrying out their projects. It is recommended to first try to change the conditions which have caused an individual or group to be adversarial. For example, changing some aspect of the project to meet the needs of the adversary without jeopardizing the overall objectives of the project. In other cases, the best option may be to work around an adversary. Finally, PMs may, on occasion, need to appeal to a higher authority if it is clear that an adversary is blocking project accomplishment.

Planning Appropriate Responses

Each type requires different managerial responses. One approach I have found useful is to have PMs identify an ally, bedfellow, fence sitter, adversary, and opponent with whom they must deal with in their projects. For most PMs, this is a relatively simple matter. If a PM can only identify two or three of the types, that is fine too. This question is then asked: “What specific behaviors does this person exhibit?” Then, I ask the PMs how they have dealt with the individual. In other words, “how have you dealt with your opponent or adversary?” Finally, the PMs are then asked what might be alternative (and perhaps more productive way) to deal with the identified individual. The learning which often occurs here is that there is often a better way to deal with people who can influence project outcomes. Once a PM masters these techniques it can be a highly useful technique for coaching others on the project team since they too will often encounter opponents, adversaries, fence sitters, etc.
THE POLITICS OF SENIOR MANAGEMENT RELATIONSHIPS

Much of the discussion thus far has focused on dealing with power issues and political relationships at the peer level, e.g., horizontal relationships. Managing these relationships effectively is important to achieving effective project performance. Equally important, however, is managing the PMs superiors and sponsors. This is sometimes called, “managing one’s bosses.” This is an important concept for PMs to learn. There are four concepts, which are particularly important in “managing upwards” and developing and maintaining effective relationship with superiors [Wilemon, 1999 and Kerzner, 2001]. These four interrelated concepts are examined below.

Visibility

Do the senior managers see the project and the results being achieved? Is the project transparent to those who provide resources and support to the project? Project visibility is like a rheostat in that in some cases in needs to be turned up and in other cases turned down. An example of when more visibility is needed is when the project needs more resources or support and the PM needs to make the results achieved to date very clear. If senior management sees that the project is accomplishing its objectives, then resources are more likely to be forthcoming. As noted, in some cases, the visibility of a project needs to be turned down or moderated somewhat. One example where this could occur is if a problem develops and the PM and his team need time to fix the problem. It is never recommended that the visibility of a project be turned down to hide ‘unfixable’ problems. Nothing can destroy the credibility of a project leader more quickly than hiding serious, unresolvable problems for lengthy periods [Wilemon, 1999].

Priority

In most organizations there are several projects being managed concurrently. In addition, each project may be competing for management attention and resources with other important developments within the organization. In terms of achieving project success it is important to keep one’s project a priority in the eyes of senior managers. There are several ways one can affect the priority given to a specific project: For example: 1) Discussing the benefits on one’s project to the organization; 2) Illustrating the potential ‘spin-offs’ of a project, e.g., new technologies, new markets, etc.; 3) Discussing achievements to date; and 4) Discussing the less obvious benefits of a project, e.g., organizational learning, development of people, etc. [Wilemon, 1999].

A challenge PMs often face with their projects is keeping the priority of their projects at an acceptable level. What may be a high priority project to senior management this month may diminish as new, exciting projects are introduced to the organization and require the concentrated attention of management. In a more severe case, a “crisis” within the organization can influence
the distribution of priority among the projects in the development portfolio.

**Accessibility**

One of the most important factors in managing upwards and exerting political influence is the concept of accessibility. Accessibility implies that the PM has access to key senior managers. Without accessibility it is difficult to champion the project, communicate project needs, and “manage attention.” As we’ve noted, each of these four variables in “managing upwards” is related to the others. Having accessibility, for example, can influence priority and project visibility. In an important sense, accessibility is a precursor for project visibility. As defined here, accessibility is a more personal concept than visibility. A project may have considerable visibility due to presentations and status review meetings yet, still not have the attention it needs from a few key senior managers. Accessibility helps ensure that a project gets the attention it needs.

**Credibility**

The fourth factor relating to managing senior management relationships is the PM’s credibility. Credibility implies that senior management trusts the PM and that he/she is trustworthy. The source of most credibility is performance, meeting commitments, and “telling the truth.” The higher the performance, the more likely the PM’s credibility will be positively impacted. Credibility is an important factor in selecting a PM and it influences how management views the PM’s project. Meeting performance commitments fuels one’s credibility with management. A useful process for project managers is to engage in is a self-diagnostic of these four major variables. A brief explanation of how PMs can use this diagnostic approach is discussed below.

**Assessing Senior Management Relationship Variables**

A PM should assess several times during the execution of a project the following questions relevant to their relationship with senior management [Wilemon, 1999]. For example:

- Does my project have sufficient visibility with senior management? Do they understand what we are trying to accomplish with the project? Do I have sufficient visibility with key senior managers who can influence project resources, etc.?

- Does my project have the priority it needs within the organization? Have I noticed any changes in the priority assigned to my project? If so, what are the consequences?

- Do I have the necessary accessibility to key functional and other senior managers who can influence my project? Have there been changes in my degree of accessibility? If so, why and what are the consequences?

- What is the credibility of this project with senior management? How is my credibility? Is it
changing? If so, why and what are the potential consequences?

**Strategy Implementation**

The third phase in the process of dealing with senior management involves the actual implementation of the strategies [Wilemon, 1999]. If the project’s visibility is low, there are a number of steps PMs and their teams might do to increase visibility. For example, discussing the project with various senior managers privately, holding an “open house” to highlight the project and its benefits to the organization; asking a key customer to discuss the importance of the project to their organization and their plans for using the project; and having a pilot demonstration if the project is close to full development.

If priority is considered too low for the PM, he or she can discuss the value of the project with senior management and key functional managers. When discussing priority issues it is always important to discuss the economic benefits of the project to the organization as well as some of the less obvious benefits, e.g., learning, creating a “strategic beachhead” for a new market, etc.

If accessibility is identified as a problem, what factors are blocking the PM’s accessibility to senior management? Specifically, which managers are key in shaping a project’s destiny? If accessibility is a problem for the PM, it might first be gained via short memos/e-mail notes/discussions. As the senior managers become more interested, direct discussions can often be achieved. A key issue with accessibility is determining what should senior managers need to know about a project and then deciding how best to communicate this information to them.

If the credibility of the PM or the project is an identified issue, then the PM needs to determine why credibility has eroded or is not at a desired level. Then, steps need to be taken to address the source of the credibility problems. Since credibility is largely based on performance and trustworthiness, the PM want to ensure that everything possible is being done to meet/exceed expectations. If this is successful, credibility is likely to increase.

Once the strategy to increase visibility, priority, accessibility, or credibility has been implemented, then the PM wants to watch for changes in perceptions and behaviors of the senior managers toward the project. If credibility, for example, increases this can obviously affect such factors as priority, visibility, and accessibility. So, again, these four factors are highly interrelated and interdependent. Moreover, assessing the status of each factor should occur throughout the project as issues may develop which can adversely affect any of the factors.

**SUMMARY**

The purpose of this paper has been to present a framework for understanding some of the power & political dynamics which occur within the project manager’s work environment. This paper...
first examined the role of power in gaining and sustaining support for the project manager. We then examined the political issues of dealing with different types of behaviors frequently encountered in project environments. Using Block’s framework and applying it to a project management environment, we focused on how to deal effectively with bedfellows, allies, adversaries, fence sitters, & opponents. Several strategies were suggested for handling each type of behavior. Finally, we examined four concepts helpful in managing the politics of project support. These concepts include managing visibility, priority, accessibility, and credibility. Several strategies were advanced for assessing & improving each of the factors. It is emphasized that this assessment needs to be several times during the life of a project Duarte, D & N. Snyder, 2006]

Not addressing and understanding the impact of the issues discussed in this paper can have a profound impact on project performance [Laufer, A & E.Hoffman 2000]. Unfortunately, limited research attention has been focused on these important areas. It is hoped that researchers will focus their efforts on these important issues in the future.

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A Primer in Information Technology Sustainable Development

Joe T Roberts
Marlene V Wilcox, Ph. D.
Claremont Graduate University

William E Wilcox, Ph. D.
University of Northern Colorado
marlene.wilcox@cgu.edu

ABSTRACT

Sustainable development has garnered much recent attention in the business world and information technology industry. A review of existing studies and a close look at the potential benefits and pitfalls of sustainability allow for a better understanding of the growth and value of “green IT.” Key players in the industry also provide examples on how sustainability has been impacting individual organizations. This paper also provides strategies for addressing sustainable development in IT, an overview of what to expect in this area for the near future as well as suggestions for future research.

Keywords: information technology sustainable development, IT sustainable development, green computing, green IT
INTRODUCTION

“Sustainable development” is a term that is heard more and more frequently in business and the information technology (IT) industry; however, its true implications are often overlooked. When talking about sustainable development, it is also common to hear people speak of “green computing” or “green IT.” What exactly do these terms mean? Sustainable development can generally be described as “paths of progress which meet the needs of the present generation without compromising the ability of future generations to meet their own needs” (Brundtland, 1987, p. 4). The green computing movement is “a multifaceted, global effort to reduce energy consumption and promote sustainability” (Kurp, 2008, p. 11). It can be said that IT sustainable development or green IT (the terms will be used interchangeably in this paper) is that which allows organizations to grow without causing harm to the environment and future through technology. Sustainable development in IT is a trend that is poised to have major implications for our future.

Attention to green IT and developments in this area has already grown considerably. Addressing the need in the widespread global campaigns to fight climate change, IT organizations have also engaged in numerous initiatives within their own infrastructures. Large corporations such as Google, IBM, and Microsoft have joined the fight to protect the environment while, at the same time, enhancing their own profitability. These companies have discovered that sustainable development not only benefits the environment, but also their own organizations and society as well. A review of both the benefits and drawbacks will help generate a clearer picture of what this will imply for the future of our society.

REVIEW OF EXISTING CASES IN IT SUSTAINABLE DEVELOPMENT

Numerous sources including industry articles, materials and websites have presented studies on the topic of sustainable development in IT (“Green Rankings 2010”, 2010; Heimbuch, 2009; Wu-chun, Xizhou, & Rong, 2008); the vast majority are advocates already enforcing green initiatives within organizations. Media (i.e. news reports and web sites) is playing a big role in the growth of the movement, with a recurring message suggesting that the benefits of sustainability will eventually outweigh the costs. Many writers have stated there are a lot of misconceptions about the topic and these are currently being debated. It is sensible to examine a few of the industry studies in order to briefly understand what experts are saying.

In May 2009 Symantec, a major security software company, released the Green IT Report (Symantec, 2009). The report surveyed the current state and awareness of green IT of over 1000 companies worldwide. Some of the key findings of this study are: green IT budgets are rising, IT is willing to pay a premium for green equipment, and green IT initiatives have become more of a priority (p. 3). One interesting statistic is that 72% of the respondents said green IT budgets would rise in the next 12 months; this is interesting because, as the study states, the typical company spends between $14 million to $20 million per year on data center electricity (p. 7).
The study also cites many more interesting statistics that show the growing importance of green IT (some will be mentioned later in this report).

IDC, a marketing and research firm, published a case study about the move towards green computing in corporate IT infrastructure (Daoud, 2009). The study, featuring Fox Entertainment Group, lists various steps and strategies companies are using to go green; it is a good example of typical corporate actions regarding sustainability. Three main objectives are listed as the reasons for companies to pursue green IT: 1) energy consumption reduction, 2) environmental stewardship, and 3) cost avoidance (p. 1). The study, a strong proponent of green computing, reveals the ideas and techniques that were used by Fox Entertainment Group to achieve its goals.

In an attempt to determine the effectiveness of organizational efforts towards environmental sustainability Newsweek conducted a study researching companies all across the United States to determine their “Green Ranking” (‘Green Rankings 2010’, 2010). The top five companies in the ranking are (in order): Dell, Hewlett-Packard, IBM, Johnson & Johnson, and Intel—four of the five are IT companies. This study shows the extent to which companies have gone to reduce carbon emissions and achieve environmental stewardship. Additionally, the ranking system demonstrates an effective methodology for assessing the progress of sustainable development. The most successful companies demonstrated that the cost of going green has been worth it financially for their organization. Like the aforementioned studies, the Green Rankings also help promote the growth of sustainability—in this case, by praising companies with strong green initiatives.

The literature suggests that another benefit of sustainable development in IT is its ability to spark innovation, allowing adopters to achieve a competitive advantage. Companies not following the trend of “going green” will fall behind the pack and struggle to find success (Nidumolu, Prahalad, & Rangaswami, 2009). After examining the sustainability initiatives of 30 large corporations, Nidumolu et al. (2009) concluded that sustainability provides organization and technological innovations that will result in additional revenues and profits. They also suggest that many corporate executives have the misconception that sustainability is nothing more than a burden. Reasons related to costs savings are cited however to thwart this negative belief.

**BENEFITS AND CHALLENGES OF SUSTAINABLE IT DEVELOPMENT**

**Benefits**

Why are organizations in IT so drawn to sustainable development? To understand the reasons, the objectives of environmental sustainability or environmentalism should be first examined. The main problem stems from greenhouse gas emissions and climate change, which affect all life on Earth. According to the U.S. Environmental Protection Agency (EPA), climate change could result in extremely adverse effects such as severe flooding on coastal areas and extreme weather. The EPA warns that climate change can also be harmful to human health due to extreme periods.
of heat and cold, climate-sensitive diseases such as malaria, and smog episodes ("U.S. EPA", 2009). The general goal of environmentalism is to mitigate these effects.

IT organizations are realizing that they have much to gain by moving towards sustainability. They have much at stake since there are potentially catastrophic scenarios for the future. Along with the changes stated by the EPA, Brown (2009) also points out the possibility of mass extinctions, reduced agricultural fertility, and mass migrations (Brown, 2009). Global economies and companies are unlikely to grow given such alarming scenarios. It is beneficial for these organizations to do what they can to help. As Laura DiDio of NextGen Research notes, there is a pervasive attitude amongst IT companies that "green desktop and server hardware are good for the planet, and what's good for the planet is good for business" ("NextGen Research", 2009, para. 2).

As IT organizations join world efforts to prevent climate change, they are also discovering a myriad of other benefits. These organizations are realizing that they can greatly reduce costs, lower energy use, decrease waste, improve marketing, and promote innovation by going green: these benefits allow companies to improve their business and make more money. At the same time, organizations are able to fulfill a socially responsible role of protecting the environment.

Inefficient energy consumption is a major problem that leads to wasteful spending at many IT organizations. IDC (2009) notes that energy consumption reduction is the most visible goal for many organizations (Daoud, 2009). By reducing wasteful consumption, an organization can dramatically lower costs (Nidumolu, et al., 2009). There are several ways that IT organizations can prosper financially by going green. The U.S. Postal Service for example saved over $2.25 million by using virtualization to reduce power consumption in its data centers and replacing workstations with power saving monitors (DrAmio, 2009). Microsoft was able to save $250,000 in annual energy costs just by raising the temperature of their server rooms (Miller, 2008). Servers use an astounding amount of energy in the United States—this amounted to about 1.2% of all electrical use with a bill of $2.7 billion in 2005 (Koomey, 2007). A lot of this energy can be conserved by doing things such as buying more efficient servers, moving data centers to cooler locations or near a renewable energy source, and turning off machines that are no longer required. Cost reduction is undoubtedly a benefit that every organization can enjoy.

Organizations are also wasteful in production when many of their resources could be reused. Recycling can be a great method for lowering waste outputs and reducing costs. Cisco provided a good model for reuse when they created a recycling group in 2005. Reuse of equipment went from 5% in 2004 to 45% in 2008. Recycling costs were reduced by a total of 40%, resulting in an additional $100 million in profits (Nidumolu, et al., 2009). Trimming waste is quite appealing when it allows organization to save money in an environmentally friendly way.

There are also benefits to organizations from a marketing standpoint. Helping the environment is good for marketing as consumers are simply attracted to environmentally friendly products. Surveys have shown that Millennials are more apt to switching to products that are environmentally sound and are willing to pay more for green products: they also prefer to work

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for companies that are known to be environmentally sensitive (Brown, 2009). With global warming being a concern on the mind of consumers, in the supermarket, most consumers are demanding carbon labeling on products--this ultimately impacts many of their purchase decisions (Dearne, 2008). Managers are increasingly becoming aware of this trend. In a 2009 EventView survey of corporate marketing managers, 15% of respondents were planning to pursue green tactics as part of their event-marketing program in the next year while 46% said they were already pursuing green marketing tactics (as cited in Clarke, 2009). Green products are currently the rage and organizations able to market to this are likely to prove more successful.

In support of sustainable IT development, there are also arguments that sustainability will promote innovation. By developing green technologies, companies are gaining new competencies that will be hard for slower movers to match. The goal of becoming environmentally friendly is quite similar to those of corporate innovation; hence, sustainability is being treated as “innovation’s new frontier” (Nidumolu, et al., 2009, p. 58). By participating in sustainable development, companies can also get ahead of the curve by adhering to the strictest environmental regulations even though it may cost them money in the short term. For instance, if Ford and Chrysler had complied with strict California emissions standards in 2002, they would now be ahead of their competition when the standards are enforced nationwide in 2016 (Nidumolu, et al., 2009). By developing new ideas towards the goal of sustainability, IT organizations are also creating promising ideas for business.

**Challenges**

Although arguments can be made for the benefits of sustainable development in IT, not everything about it is positive. The IDC case study on Fox Entertainment Group addresses three notable problems common to organizations: 1) worries over added cost, 2) fear of complexity, and 3) concerns over skills issues (Daoud, 2009, p. 4). The added burden of these issues make green IT appear to be, in many cases, more trouble than it is worth. Additional arguments against green initiatives also include an overemphasis on social responsibility versus business objectives and a lack of resolve due to a message driven by environmental crisis.

The main drawback to sustainability is that it is generally expensive for organizations to support. Something that is environmentally friendly does not necessarily mean that it will be profitable. Additionally, management teams are unlikely to utilize a green approach unless there is a good chance for profits (Schendler, 2002). Management normally wants to know with certainty that their efforts will succeed in terms of finances and sustainability: this is often a difficult goal to achieve. Companies are therefore more likely to invest in ideas that offer a more promising return on investment. Furthermore, cost savings are constantly overlooked since business people are more accustomed to making money through action rather than saving (Schendler, 2002). As it seems, many organizations believe that going green is not affordable, especially during difficult economic times.
Achieving sustainability in IT is a complex task that many organizations might be reluctant to undergo. The biggest problems in implementing sustainability in IT are organizational in nature (Daoud, 2009). A number of issues could be involved to complicate matters. First, there are bureaucratic problems. Many senior managers might be focused on other issues instead of dealing with sustainability: without the proper support from managers in the chain, it may be difficult to accomplish the mission. Second, sustainability is susceptible to failure if there is no pivotal leader. Third, many companies are failing with green IT projects because the drivers are lacking in confidence. Fourth, companies may also be prone to failure because of a lack of priorities. As in many fast-paced companies, matters with a priority higher than sustainability in IT will take precedent. Finally, another matter of complexity deals with measuring progress: it is important to constantly report outcomes to stakeholders so that they continue to support the projects (Daoud, 2009, p. 14). It is often the case with upper management that a project without visible progress will get pushed aside. These and the other many intricacies involved with implementing green IT can be a potential headache for an organization already dealing with a multitude of issues.

Another problem facing many IT organizations wanting to embark on a sustainable IT development endeavor is that it requires a certain expertise, which current employees may not possess. A few essential competencies are: a) expertise in techniques such as carbon management and life-cycle assessment; b) the ability to redesign operations to use less energy and water, produce fewer emissions, and generate less waste; c) the capacity to ensure that suppliers and retailers make their operations eco-friendly; d) the skills to know which products or services are most unfriendly to the environment; e) the ability to generate real public support for sustainable offerings; and f) the management know-how to scale both supplies of green materials and the manufacture of products ((Nidumolu et al., 2009, p. 60). These are sample of what is required in the overall efforts of green projects. Advanced training and outside consulting are essential necessities that many organizations may not have the means to attain.

Sustainability is often viewed as a burdensome duty, since most executives feel that sustainable development is more of a social responsibility instead of a business objective (Nidumolu et al., 2009). These individuals may think that it is just a way to meet moral obligations that are outside of their corporate strategies. Furthermore, sustainability is often associated with other costly compliance burdens such as Sarbanes-Oxley (Dearne, 2008). These issues give managers a bad perception of environmental compliance. Some managers argue that companies in advanced economies are disadvantaged since developing countries do not face the same pressures for compliance ((Nidumolu et al., 2009, p. 57). The overall belief is that they are giving an advantage to their competitors: this may lead to failure in recognizing the potential economic gains associated with sustainability. When treated as a responsibility, sustainability becomes viewed more as an inconvenience rather than as a business driver.

Some researchers have made a pessimistic case for IT sustainable development by stating that sustainability has a crisis-driven message linked to environmentalism (Mulvihill & Milan, 2007, p. 660). Thus, sustainability has limitations on how far it can actually motivate people—a sense of urgency is a strong motivator for sustainability. If these feelings were to subside, the efforts
of sustainability could also wane. Without ongoing messages of impending environmental disaster, people may fail to see the benefits of green IT.

**IT INFRASTRUCTURE SUSTAINABLE DEVELOPMENT STRATEGIES**

There are numerous ways in which IT organizations can implement sustainable development into their IT infrastructure. Strategies include: reducing energy consumption, telecommuting, reusing equipment, virtualization and server room temperature adjustments. Organizations should develop a clear-cut strategy in order to be successful. Knowing the benefits of sustainable development allows organizations to become more actively engaged in achieving their goal.

Organizations can reduce energy through a variety of approaches, some of which are discussed next. Basic strategies include: a desktop strategy, an office strategy, and a remote strategy (Daoud, 2009). A desktop strategy involves simple tasks such as disabling screen savers and turning off monitors after a certain length of time through automation or instructing employees to do so; an office strategy focuses on using standby features on printers, copiers, and other office equipment; and a remote strategy concerns telecommuting and remote meetings. These are simple strategies an organization can implement to reduce energy use.

To achieve energy reduction on a larger scale, IT organizations may need to reconstruct their infrastructure. IDC uses an infrastructure efficiency initiative that focuses on datacenters, server sprawl, storage utilization, and datacenter environments such as power and cooling (Daoud, 2009). Smart-grid technology, another method of large-scale energy reduction, is an industry-wide example of energy reduction. Smart grid technology is a technique of controlling the delivery of electricity to a place in the most efficient manner. Individual organizations can work with energy companies to determine the best ways to utilize electricity. Broader changes may be difficult to implement, but they have the potential for tremendous energy and costs savings in the long term.

Telecommuting and virtual meetings are effective ways to protect the environment and save on costs. According to Dennis Pamlin from the World Wildlife Fund, “Increasing virtual meetings and telecommuting today could, without any dramatic measures, help to save more than 3 billion tons of CO2 emissions in a few decades; this is equivalent to approximately half of the current U.S. CO2 emissions” (Buttazzoni, Rossi, Pamlin, & Pahlman, 2009, p. 5). Organizations are also learning that telecommuting is a great way to save costs into the millions of dollars. It was reported that AT&T saved an estimated $550 million by telecommuting. They also discovered that when people telecommute up to three times a week, job satisfaction increased and the productivity level rose by 10% to 20% (Nidumolu et al. p. 61). Additionally, AT&T estimated that their telecommuters saved about 5.1 million gallons of gasoline (Buttazzoni et al.). It should also be noted that telecommuting cuts down traffic congestion, thus reducing emissions.

IT organizations can become more sustainable by reusing some of their aged equipment. Old computers and servers become waste that requires energy to dispose. A motivated recycling
program can be a beneficial strategy for any organization. Rather than scrapping products that are no longer used, organizations can turn their waste into profits by finding alternative uses of the aged or returned products (Nidumolu, et al., 2009).

Virtualization and other consolidation techniques can help an organization improve its efficiency by basically converting hardware into software. By doing this, virtualization can allow an organization to scale down on its use of equipment such as servers. With help from HP, Citi was able to save $1 million on power and cooling costs by consolidating 15% of its 42,740 servers through virtualization (Wasserman, 2009). EMC Australia managing director David Webster says, “VMware and virtualization software applications can obviously have a massive impact on running costs, while our flash storage products cut power consumption by a half to two-thirds, compared with a standard disk drive” (as cited in Dearne, 2008, p. 35). Better hardware management and an awareness of virtual technologies are useful initiatives for sustainable development.

A common activity many IT organizations are engaging in to become more environmentally friendly is raising the temperature of their server rooms. This simple act is saving businesses hundreds of thousands of dollars in energy costs. In 2009 the American Society for Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) recommended rooms to be raised from the standard upper limit of 77 degrees Fahrenheit to 80.6 degrees (Miller, 2009b). This recommendation could result in large savings in terms of costs and emissions.

**SUSTAINABLE DEVELOPMENT IN ACTION AMONG KEY IT PLAYERS**

In the IT industry many of the key players have already embraced the notion of green computing. Giants like Google and Microsoft have followed suit with the global goal of environmental sustainability. Examples from a few of these companies are discussed next.

Google is known not only for being on the cutting-edge of technology, but also for being on the leading edge of sustainable innovations; it is a company that is totally passionate about energy efficiency. A look at one of Google’s once “secret servers” offers a glimpse into its determination to become super-efficient. To minimize the amount of wasted capacity associated with using uninterruptible power supplies, Google uses a built-in battery for its servers to prevent waste (Shankland, 2009). Google also works hard to keep up its power usage effectiveness (PUE) scores. PUE scores were created by a consortium named Green Grid to measure the amount of power that goes directly to computing instead of external services such as cooling (Shankland, 2009). The scores are helpful for monitoring energy efficiency. In addition, Google is also working on solar thermal power mirrors which can help to make its data centers greener (Miller, 2009a). Google demonstrates the use of an energy reduction strategy for sustainability.

Sustainability in IT is also exemplified by IBM. From its cloud computing technologies in China to green initiatives in the cornfields of Iowa, IBM has developed many environmentally friendly applications. In September 2009, IBM announced that it would turn Dubuque, Iowa into a model for environmental sustainability (Hamm, 2009). The company is planning to do this by using
technology to monitor water and energy in order to calculate the maximum benefits. IBM also promotes telecommuting: 25% of its employees telecommute, resulting in annual savings of over $700 million (Nidumolu et al. p. 61). More recently, IBM was recognized for building the world’s most efficient supercomputer (Jackson, 2010). IBM’s approach illustrates both energy efficiency and remote strategy initiatives.

Intuit, the technology company known for its Quicken and TurboTax software, presents another illustration of environmental IT sustainability. Intuit has developed an approach entitled the Intuit Green initiative that is ingrained into the company’s culture. The company believes that sustainability is not only good for the environment but will also drive growth within the company (Croom, Barani, Belanger, Lyons, & Murakami, 2009). Intuit undertakes several initiatives to promote sustainability; one example is its use of high definition video conferencing instead of traditional travel (Croom, et al., 2009). Intuit is also working with its suppliers to reduce the physical size and format of packaging for its software (Croom, et al., 2009). At Intuit, sustainability initiatives are implemented throughout its supply chain, in addition to the use of remote strategy initiatives.

Hewlett-Packard (HP) presents several more examples of environmental sustainability in action: they were ranked number two in Newsweek’s 2010 Green Rankings (“Green Rankings 2010”, 2010). HP is known for its computers and servers: one of its strategies is to incorporate sustainable technology into its machines. The company’s Performance Optimized Datacenter (POD) can be maintained at a cold aisle temperature as high as 90 degrees (Miller, 2009b). In 2008, HP made plans to save $8 million annually by building new data centers that used Dynamic Smart Cooling (Miller, 2008). Dynamic Smart Cooling uses computational fluid dynamics (CFD), a sensor network, and a centralized server to control cooling. Additionally, HP promotes strong programs to reduce greenhouse gas emissions. In 2009, the company committed to reduce greenhouse gas emissions by 40% by 2011 (Heimbuch, 2009).

Software giant, Microsoft, is also active in sustainability. The company built an air-cooled data center in Dublin, Ireland which runs without any chillers: a process accomplished simply by drawing in outside air (Miller, 2009b). The server rooms at this data center run at a temperature of 95 degrees Fahrenheit, compared to the temperature of a typical server room, which ranges between 68 to 72 degrees (Miller, 2009b). It is estimated that this will result in decreased electrical costs and also considerable savings in water usage. Microsoft is also setting a trend with other companies like Google by building new data centers near hydroelectric power sources (Wasserman, 2009). Microsoft is a leader of sustainability in data center management.

**Progress of Sustainability in IT**

Sustainability in IT has had significant growth in the first decade of the 21st century. It was given a jumpstart when environmental sustainability became one of the top Millennium Development Goals at the United Nations Millennium Summit in September 2000 (United
Nations, 2010). Ensuring environmental sustainability is listed as the seventh goal; the section most relevant to IT is the stipulation to reduce CO2 emissions. IT organizations appear to have responded to the challenge by working with their customers to make visible changes in IT towards sustainability (Buttazzoni, et al., 2009; GreenerComputing Staff, 2010; Koomey, 2007; Nidumolu, et al., 2009; Pratt, 2008). Many organizations have become increasingly aware of the need for green IT and are taking the steps towards achieving it.

There have been various interpretations by recent surveys on the current state and mood of green initiatives within IT organizations. According to a Computerworld Annual Forecast survey in 2008, 42% of IT executives said that they had no plans to reduce energy consumption or energy emissions in the next year; and about three quarters said that they had no plans for creating oversight committees for energy-saving initiatives (as cited in Pratt, 2008). The disadvantages of sustainability appear to be strong disincentives for many managers. However, in the 2008 U.S. Green IT Survey, 44% of CEOs said that IT would be very important for reducing environmental impact compared to just 14% in the same survey from the previous year (as cited in Pratt, 2008). It appears that managers are becoming more concerned about green IT initiatives even though they may not be planning any implementations.

Although there has been substantial growth, the economic downturn in the latter portion of this decade has slowed the advance of green initiatives. Investments in green technology dropped to $513 million in the first half of 2009 from $2 billion in the same period of 2008 (as cited in Woody, 2009). Despite this, the recession may have unexpectedly given green IT a boost. Companies attempting to save money may follow some of the cost saving benefits involved in implementing green initiatives, like turning off idle machines. It will be interesting to see the direction of green IT initiatives as the global economy recovers.

Regardless of the state of the economy, sustainable development is a key issue for most companies. In 2009, 97% of companies were discussing a green IT strategy; 67% were in the discussion or trial stages; and 30% were already using a strategy (Symantec, 2009). Only 1% of companies said that green IT was unimportant (Symantec, 2009). This goes to show the prominence and potential growth of sustainable development in today’s IT companies.

FUTURE DIRECTION

It is apparent that sustainable development in IT will continue to grow in the future. It is a trend that simply has too many benefits for organizations to ignore. Even with the recent slowdown in the movement due to the global recession, many analysts are predicting enormous growth for green computing in the next several years.

Marketing research provides a good indication of the future direction for sustainable development in IT. The market for green computing equipment is estimated to grow from $47 billion in 2009 to $223.7 billion in 2013 ("NextGen Research", 2009). It is predicted that green IT services will grow from a start of about $500 million in 2008 to almost $5 billion in 2013 (as
cited in Dearne, 2008). These numbers seem realistic given the recent growth of green IT in the last decade and the widespread advocacy about the dangers of climate change.

NextGen Research has some more interesting predictions: according to its studies, the goal of creating a 100% totally “green machine” will not be realized for many years to come. More specifically stated, “It will take years beyond the forecast period before all computer and server hardware consists of electrically efficient devices made up of biodegradable, recyclable and/or reusable parts” (“NextGen Research”, 2009). In the near future, computer equipment will more than likely still cause some form of “harm” to the environment. The study also predicts that global green PC and server hardware will grow due to several key trends: growing electrical demand, constraints on corporate data space, power requirements and costs, and a lower cost of ownership for green computing products.

The demand for more electricity will definitely be a key driver for the growth of sustainable development in IT. In 2008, the amount of dollars spent on data center power doubled from the previous six years (Valanju, 2008). Additionally, the projected growth of data center electrical use is expected to exceed 100 billion kilowatt-hours and cost around $7.4 billion in 2011—this is in contrast to 61 billion kilowatt-hours and $4.5 billion in 2006 (Binder & Niranjan, 2009). It makes sense that many organizations will pursue ways to reduce their electrical costs, especially those that maintain large data centers. Furthermore, Gartner, a leading IT research company, predicts that half of Forbes Global 2000 companies will spend more money on energy than on actual hardware (as cited in Valanju, 2008). The importance of electrical usage and conservation is poised to continue to rise.

Telecommuting is an area that has a potential for future growth. Approximately 30% of the U.S. work force is willing to telecommute (Buttazzoni, et al., 2009). Remote communication technology is visibly growing and will make telecommuting more effective. It is estimated that by 2030, up to 46% of car commuters in the U.S. will instead be teleworkers (Buttazzoni, et al., 2009). Telecommuting should help to reduce global emissions and make for a greener future.

Looking at current trends, hardware and software should become more energy efficient in the future. Hardware, such as servers, are becoming increasingly efficient in order to comply with consumer expectations. Software will likely help energy efficiency as well. Microsoft has been implementing energy saving features into their operating systems. For Window’s Vista, Microsoft added 30 power-management features, including a "sleep" mode that can save $50 a year on energy for every computer (Wasserman, 2009).

Many factors will continue to drive the global growth of sustainable development in IT. Today, much of the issue seems to be focused on energy reduction, specifically with data centers. However, other initiatives such as telecommuting will continue to be important. People can expect to see political issues like stricter emission standards and other global warming initiatives play important roles in green IT. The U.S. has been a leader in green IT technology but other regions are expecting to develop. It is predicted by Forrester Research that the Asia-Pacific
region will be slow in adopting green IT, but will peak in spending between 2015 and 2016 (as cited in Dearne, 2008). It is reasonable to believe that green IT will show worldwide growth.

**IMPLICATIONS FOR RESEARCH AND PRACTICE**

The future workforce and organizations as a whole still need to be made more aware of IT sustainable development. Additionally, more universities need to offer courses and even degrees related to green IT, such as the one offered by Metropolitan Community College (Omaha, Nebraska) in collaboration with IBM. Those organizations have teamed up to create the first green data center management degree (Crosman, 2009). The program allows students to learn about virtualization and server consolidation, energy efficiency, and other data center skills (Crosman, 2009). The degree is even offered online, demonstrating another facet of green IT—virtual classrooms.

Research has shown that sustainable development in IT can increase innovation (Nidumolu, et al., 2009). Sustainable development is a driver of innovation and it is well known that the IT industry relies on innovation. Organizations need to instill the importance of implementing green initiatives into their organizational culture. In order to help employees buy into the concept of green computing, additional research can be undertaken to show the value and implications of successful adoption, including how innovations in sustainable development have helped to increase the top and bottom-line results of organizations. It is important to recognize that without these green initiatives, the industry as a whole might be missing out on essential technologies.

Progress measurement is important to managers and owners so that sustainable development projects are supported and continued (Daoud, 2009). In February 2020, the Securities and Exchange Commission (SEC) issued an interpretation requiring more disclosures on the risks associated with climate change for publicly traded companies (SEC, 2010). These risks include the effects of legislation, international accords, and indirect consequences of regulation and business trends. Additional research needs to be conducted to identify metrics that will be useful in promoting and advancing sustainable IT initiatives, as well as identifying measurements that are comparable across companies for public use. The Newsweek “Green Ranking” uses a composite score that considers multiple factors, and not just a company’s environmental impact or carbon footprint (“Green Rankings 2010”, 2010); however there is still no consensus on what is considered an overall, appropriate measurement instrument.
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Research Gaps Pertaining to the Design of Global Business eLearning Master's Program

Amy Puderbaugh, Ph.D.
Walden University
317 British Columbia Avenue
Lynden, WA 98264
apuderbaugh@comcast.net

ABSTRACT

The purpose of this paper was to examine the unique areas of concern when establishing an eLearning program in the field of global business. A large gap was found in the research material available. However, a survey of eLearning and a global management subject matter and challenges appear. This paper raises practical concerns for future research and proposes questions that should be considered within the design of a global business program.

Keywords: subject matter course design, distance learning, graduate global business courses, international business program, eLearning, global management competencies

INTRODUCTION

Workforces are becoming more global (Remtulla, 2007a) and educational instructions are moving more towards non-traditional learning ("Online enrollment", 2010). Since the use of a delivery method can significantly shape the success of a program, the success of graduates, and the success of an institution's reputation, it is important that the choice delivery method be well-examined. As different programs within an institution have distinct subject matter that needs to be uniquely presented and tailored it is important that the design and delivery of each topic of study is looked at individually.

The purpose of this work was to add to the breadth of research available by examining questions that should be answered in the application of an eLearning platform to a global business master's program. The project also calls to attention a large gap that existed in available research material. A global business program may also be known as names such as an international business program, a global management program, or similar title. The program may appear as a solo offering or as a concentration within another field (such as an MBA program with a global
business concentration). This paper will not distinguish; it will focus on courses that are solely delivered via an eLearning format and not examine ramifications for on-ground courses with an eLearning component or 'hybrid courses' that consist of a mix of on-ground and online components. This work did not consider courses that had residency requirements or on-ground meetings.

If there are areas of global business management that cannot be taught via eLearning educational leadership will need to know this. If there are areas that are difficult to teach, educational leadership will need to know what techniques are effective. Limitations need to be examined honestly as there will be ramifications on the success of the program. An institution should also be proactive in this search for information as finding a problem out reactively could mean the problem is widespread and debilitating to the institution.

EXAMINING ELEARNING

Rosenberg (2001) defines eLearning as, "the use of internet technologies to deliver a broad array of solutions that enhance knowledge and performance". Rosenberg further states that eLearning is networked, delivered via a computer and standard internet technology and that it is focused on the broadest view of learning. eLearning is a popular, but smaller segment of the field of distance learning. Distance learning can involve areas such as media tapes or delivery via standard mail. A key to eLearning is the replacement of face-to-face interaction with a hardware interface (Remtulla, 2007b).

A survey by Babson Survey Research Group revealed, in 2009 online students numbered 5.6 million, a 21% jump from the previous year. 60% of non-profit schools said online learning was a part of their online plan compared to 75% of for-profits. For-profit online schools may be negatively impacted by the Gainful Employment Act proposed by the Department of Higher Education in 2010 ("Online enrollment", 2010).

Although eLearning is an increasingly popular way to deliver corporate training programs (Usoro, & Majewski, 2009), this paper focuses on eLearning in the educational environment. Some of the research on corporate eLearning does crossover into the educational environment. Corporations using eLearning can experience lower costs and increased access for eLearning participants (Usoro & Majewski, 2009). Organizations may profess that eLearning brings them a greater workplace democracy, higher levels of workplace education, and greater workforce empowerment (Remtulla, 2007a).

At some organizations eLearning has been linked to reduced administrative overhead, improved productivity, and facilitating the flow of intellectual capital (Cross & Dublin, 2002). Even as early as 2001, Rosenberg wrote, "the question is no longer will online learning eLearning will be implemented, but if companies will do it well".

In the educational environment eLearning can provide students with an opportunity to attend courses without altering their existing schedules, or moving house. Students can pick their most
convenient times to study (within some restraints) and have a better chance of maintaining work-life-school balance (Li, 2008). Individuals who do not feel as though they are being developed in the workplace may turn to eLearning at a university for a form of self-development in hopes that it may set them up for a future position. A student who returns to college may not even be looking at a future position in the workplace. One study by a for-profit company in the eLearning community found that 24% of Americans felt that a woman with a college degree was a better mother. The study reasoned that respondents saw a woman concerned with her own academic success as more attuned to the academic success of her children ("Does a college", 2010).

Desai and Pitre (2009) list several advantages to offering a course online. These include the time flexibility for students, the chance for a school to increase enrollment, the chance for students to have diverse group interactions with students from other cities and countries, possible exposure to unique culture and language, a wider perspective of problem solving, and project variety. Chau (2010) acknowledges that cost, accessibility and flexibility may be motivations for institutions moving to online learning. However, Chau also proposed that the modern ideal of a knowledge-based economy could result in some of the move; educational institutions are providing a commodity in demand in the consumer marketplace.

**Challenges of eLearning Facilitation**

eLearning is not without challenges. For facilitators there can be isolation, time demands, highly rigid courses, and a lack of traditional student/teacher hierarchy.

One unique challenge of eLearning is a staff that may be external to the university campus. Instructors may feel a sense of isolation from the university or program itself (Magdalena & Mellar, 2009). Instructors may have little vested interest in student success. The understanding of university support areas may be limited. Instructors working on a contract or ad-hoc basis may also be responsible for reporting or fixing the problems found within the course (Magdalena & Mellar, 2009).

Students may also experience isolation. Students did not miss the opportunities for social interaction when taking courses online (Mallory, 2007; Smith & Duus, 2001). However, in a traditional setting students may feel a closer bond to the instructor (Lucas, 1996). Smith and Duus (2001) stress the need for small class sizes due to the intense dialogue interaction that is needed between student and instructor. Smith and Duus (2001) further note that although offering a class online may result in cost savings due to increased opportunity, the small class sizes may make that savings null.

An additional challenge to instructors may be the rigidity of the course. One study found that "the demands for a structured and focused approach to virtual interactivity may be too much of a challenge for some" (Smith & Duus, 2001).
Although the course itself may be more rigid than a traditional course, instructors may find the student/teacher hierarchy within the course much less so. A course with open discussion forums may also blur the line between the instructor and peers in interaction. Instructors need to learn how to be leaders in the virtual world and build a sense of community and collaboration. Engaged faculty can help students feel connected (Cook, 2010). However, those who move from a traditional course to teaching online may find the time demands much more difficult, as students may expect quick answers to questions at any hour (Cook, 2010; Smith & Duus, 2001). A dialogue-based course may result in the need for smaller class sizes than appear on a traditional campus (Smith & Dunn, 2001).

One study suggested universities focused on course design, instructor selection and instructor involvement, as the delivery method of the course did not have a statistically significant impact on learning (Buhagiar & Potter, 2007). One case example used the social interactive website, Second Life, as an instructional tool to improve faculty engagement and to develop a sense of community among faculty and students (Sutton, White, Mbizo & Stewart, 2010).

Content Design Factors

There are several factors that should impact how a course is crafted and presented. Among these are course content, pedagogy, the subject matter covered, the learners, and the media to be used.

Edmundson (2009) found that course outcomes affect the course content, pedagogical approaches, and the type of media used. Some courses such as computer courses tend to be culturally neutral. Other areas such as leadership courses were "deeply imbedded with cultural values, ideology, and worldviews" (Edmundson, 2009). As the content was more complex, the pedagogical approaches and media needs become increasingly complex as well. Making the content accessible to a culturally diverse audience may include examination by observation, focus groups, country experts, interculturalists, web interface designers and a close look at the targeted learners (Edmundson, 2009). eLearning courses should be tailored based on the content and the learners unique identity and needs.

Arbaugh (2005) noted that the research in online learning tended to focus on the technological, pedagogical, or behavioral areas; "research into subject matter effects in on-line learning is almost nonexistent" (p. 58). Arbaugh notes three concerns with the lack of specific subject matter research in eLearning. First, studies that parallel progress of traditional students with eLearners seem to focus on one course and not a range of courses within a field. Second, many of the studies available seem to focus on behavior of the faculty within the classroom rather than the course content. Third, former researchers have raised concerns about teaching quantitative or technically laden subjects via the Internet. However, Arbaugh, also notes that the empirical research to support this area needs to be developed.

Universities may or may not examine the subject matter of a course when deciding whether a class should be offered online. There may be other considerations, such as space concerns,
instructor pool, or the need to be geographically diverse to get a wide enough student base. The decision to offer a course online may be solely administrative, yet instructional input will need to be offered. The instructional designs and technology chosen should align with the course goals and pedagogical goals (Cook, 2000). In order for this alignment to take place the specific subject matter area needs to be examined.

Global Management Design

In global management subject matter design, the natural place to look for program outcomes is competencies required by organizations that employ global management professionals. Much of the research focused on competencies needed function as an expatriate employee (Bücker & Poutsma, 2010). However, some competencies discussed were the ability to use social capital and diverse networks in a way that completes work effectively (Makela & Suutari, 2009).

Criticisms of MBA graduates include that they are "ill prepared to deal with complex, multi-layered issues faced by managers in global markets" (Belasen & Rufer, 2007) and that the theoretical courses that they take result in too much emphasis on the quantitative and not enough emphasis on people skills (Sulaiman & Mohezar, 2009). Tay (2001) suggests that courses such as public speaking, conflict resolution, and team work techniques be added to be business school programs in an effort to enhance soft skills of students. Bueno and Tubbs (2004) suggest that the most important global leadership competencies are: communication skills, motivation to learn, flexibility, open-mindedness, respect for others, and sensitivity. These are soft skill areas and may be areas difficult to teach or develop in students.

Over the last thirty years business schools have been forced to react to an AACSB mandate to internationalize their curriculum. Some schools have reacted by merely adding an international business survey course. Others have integrated an international component into existing subject areas such as marketing, accounting or management. Some programs insist on going beyond mandate minimums in program design (Delaunay & Blodgett, 2005).

Some traditional universities are able to take unique advantage of opportunities around them to develop competencies. Others make a conscious effort to create international core community within the university. Suffolk University developed a Global MBA (GMBA) program with the idea that it would tap into opportunities in the vibrant international business community around Boston. The program makes a conscious effort to ensure that a global perspective is always in place within the classroom. One third of the faculty members of the Suffolk University's business school were born in and educated outside of the United States; half of the faculty base has extensive experience in work or education abroad. The University maintains several campuses abroad. Fifteen percent of the students of the school of business come from abroad (Delaunay & Blodgett, 2005). MBA students at Oxford spend six months of their program with organizations located in other countries (Tay, 2001). Some universities offer a regional world focus when it comes to courses or offer some specializations or seminars abroad (such as finance in Japan) (Delaunay & Blodgett, 2005).
One on-ground educational facility redesigned the MBA program to include an international partner. The faculty split into pairs of American faculty and a non-American faculty member. "These changes, particularly the partnership, have dramatically increased the exposure of American students to international students’ decision-making style and problem solving communication, and taught them to avoid the single-frame mind" (Belasen & Rufer, 2007).

With more business practitioners becoming consultants than in the past, offering a course preparing students for consulting activities may have advantages. Students could learn about consultant communication, research, assessment and relevant business communication (Dallimore & Souza, 2002). This may be a topic that would benefit eLearners interested in global management.

Foreign language requirements may be needed by those who would like to do business in the global arena. Freeman (2001) notes languages are needed for a broader range of job functions than in the past. Freeman also notes that more small firms are taking advantage of international business opportunities than ever. Staff that can communicate effectively is needed.

**IMPLICATIONS FOR FUTURE RESEARCH**

This author was surprised by the lack of material available when it came to the design of business curriculum and global business course development. However, the lack of material itself makes it possible to suggest several areas for future research. The questions below reflect some future possibilities for study.

One area that should be examined is can global business be effectively taught online? Are there foreign language requirements, study aboard sessions, communication skills, team-building, cultural interaction, or live role playing that are a hallmark of the strongest traditional course that cannot be transferred online? What is the evidence for these gaps? Can courses or the community be supplemented or enhanced in ways that foster these core skill areas?

What areas of global business are most important to address in the design of a course? What is the evidence for these areas? What outcomes are desired in teaching global business? By what process will skills be taught that result in these outcomes? What is the relative validity of the teaching methods and approaches used? How will success be evaluated and what are plans for future monitoring?

Who is the online learning audience for a global business program? Is there a criterion of learner that indicates strong success in the program? What technology and media within the course that can effectively deliver and engage these students?

What makes an effective instructor in the field? What experience is needed? What skills are needed? What teaching approaches work best in the context of the global business material? Are these areas that can be taught to instructors? How can star performers be identified and
developed? How can student engagement be measured and how can optimum student engagement occur?

What evaluations are in place for program success? What is the impact of the global business area on the graduate degree program? Is the global business area helping the university meet program objectives and overall goals? Are student career and development related outcomes measured? Does the program have an impact on student success?

CONCLUDING REMARKS

It is interesting to note although literature material supports the need for subject matter specific design, that there is very little available information on what that looks like for global management programs within a Master's degree eLearning program. Global management and eLearning were both found to be areas of growth. This study was a rare attempt to look at the global management within a graduate eLearning context. The need for further research was evident and some areas of future, specific study proposed.
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