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DESIGN AND IMPLEMENTATION OF A PROTOTYPE FOR MANAGING ELEMEDICINE

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ABSTRACT

The current healthcare system is ineffective in providing access to quality healthcare professionals and services for patients in remote areas. The use of telecommunications and information technologies in healthcare, known as" telemedicine," has been expected to provide support for developing quantifiable solutions to this problem. To investigate the feasibility of a telemedicine system in expanding access to treatment and reducing costs, a prototype was developed to support three remote sites (clinics) and a main station (hospital). The system was supported by a database and a scheduler, which enable its operations. The prototype system was tested on a longitudinal basis, and its performance in reducing patient loads at the main station was evaluated in terms of the number of patients consulted and treated at the remote sites and main station. The results show that the system is capable of providing expanded access to healthcare services while providing potential cost savings and balancing the work load between the main station and remote sites.

THE RELATIONSHIP BETWEEN THE SUBORDINATE'S PERCEPTION OF THE LEADERSHIP STYLE OF IT MANAGERS AND THE SUBORDINATE'S PERCEPTIONS OF MANAGER'S ABILITY TO INSPIRE EXTRA EFFORT, TO BE EFFECTIVE, AND TO ENHANCE SATISFACTION WITH MANAGEMENT

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ABSTRACT

The current study examined the Transformational, Transactional, and Passive/Avoidant Leadership styles as defined by Burns (1978) and Bass (1985) and how they are perceived by subordinates in predicting subordinate Extra Effort, manager Effectiveness, and satisfaction with management. One hundred fifty IT professionals from AITP, Association of Information Technology Professionals, were administered the Multifactor Leadership Questionnaire 5X-Short form (MLQ 5X-Short). The survey measured all nine full range leadership variables and results were analyzed using multiple regression.

Three hypotheses examined the relationship between the subordinate's perception of the leadership style of IT managers and one of three dependent measures: predicting subordinate Extra Effort, manager Effectiveness, and satisfaction with management. Partial support was found for all three hypotheses. In the first, Transformational Leadership and Passive/Avoidant Leadership, but not Transactional Leadership was able to predict Extra Effort. In the second, Transformational Leadership, Transactional Leadership (via a slightly modified "reversed" form as well as the two subscales individually), and Passive/Avoidant Leadership were able to predict management Effectiveness. In the last, Transformational Leadership, Transactional Leadership (reversed and subscales), were able to predict subordinates' Satisfaction with their leaders. Most findings were consistent with existing literature. In addition, this study also identified several items that needed further examination and research.

BENEFITS OF ERP SYSTEMS FOR ACCOUNTING AND FINANCIAL MANAGEMENT

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ABSTRACT

This study was undertaken with the purpose of investigating the effect of ERP systems utilization modes on effective accounting and financial management at managerial level perspectives at a large business in Venezuela. Specifically the study seeks find out what are the benefits derived from adoption of ERP systems on accounting and financial information and management process. A qualitative case study technique was used for data collection to gain insights into the topic being investigated. The main findings of study are related to improvements of managerial decision making process, enterprise integration, accurate of financial statements and improvements of employees supervision and control.

INTRODUCTION

An ERP system is an integrated set of programs that provides support for core organizational activities. ERP is a software infrastructure embedded with "best practices," or best ways to do business based on common business practices or academic theory. ERP systems allow companies to integrate at all levels and utilize important applications, such as supply-chain management, financial and accounting applications, human resource management and customer relationship management (Boubekri, 2001) Expanding from the functional areas of accounting, human resources, and shop floor control to an enterprise-wide system has become a format for producing full organization integration (Colmenares, 2008).

An ERP system allows a company to manage its operations holistically. In kind, a second impact of ERP systems has been a general shift to manage at the activity level rather than at the more abstract level of financial transactions. This means that management accounting, with its focus on activities, can be most effective when it is used with ERP systems to incorporate the activity level for costing and performance measurement.

According to Markus and Tanis (2000), "the key questions about enterprise systems from the perspective of an adopting organization's executive leadership are questions about success."This study focuses on the benefits that organizations gain from their use of enterprise systems in the years after implementation. Research into IT evaluation has shown that, although costs are hard to quantify in post-implementation audits, benefits are harder to identify and quantify (Irani et al, 2001; Seddon et al , 2002). This study is motivated, in part, by the lack of research and literature in the information systems (IS) field dealing with ERP systems success at the latter stages in the software lifecycle in adopting organizations. For that reason, this paper focuses on post-implementation benefits from ERP systems and specifically in its benefits for accounting and financial management.

The remainder of the paper is structured as follows: next section shows a review of the relevant literature, then is described the research methodology and results. Finally conclusion are presented in the last section.

LITERATURE REVIEW

An ERP system encompasses a set of business applications ("modules") used to carry out common business functions such as accounting, stock control, logistics etc. The essence of a complete ERP system is to automate business processes, share common data across the organization but, most importantly, to produce real-time data (Nah et al., 2001).

The influence of ERP systems on management accounting was studied by Booth et al. (2000). Later cited by for example Granlund and Malmi (2002), Scapens and Jazayeri (2003), Spathis and Constantinides (2003) and Spathis and Ananiadis (2005) The study by Booth et al. (2000) is one of the first papers investigating the relationship between ERP and management accounting. The objective of the paper is to investigate, among others, the respondents' opinion and perceived benefits of ERP-systems in transaction processing, reporting and decision support and the impact of ERP-systems on adoption or non-adoption of newer accounting principles. The results indicate that ERP systems are good at transaction processing but less useful for reporting and decision support. (Booth et al, 2000) Some questions covered also the impact of integrated systems on management account practices.

The paper by Maccarrone (2000) investigates the benefits of ERP implementation as far as accounting information and management processes are concerned. The researcher identifies two categories of benefits related to ERP implementation. The time related benefits such as reduced need of time to perform some activities, which can lead to three different types of benefits, cost reduction due to time savings permitted by the system, less time is needed for single activities meaning that time can be utilized to improve the control activities which should improve the organization's competitiveness and reduced need of time entails also reduced total cycle time and increases correctness of processes. The second category of benefits are quality-related benefits including: issues related to data during the collection, storing and elaboration processes and improved quality of control activities implying improved decision making which results in higher profits.

RESEARCH METHOD

The lack of theories and the limited empirical evidence on impact and benefits of ERP systems for accounting and financial management have created the need to conduct preliminary research studies in companies adopting ERP systems. A qualitative case study approach (Yin, 2003) was used in this research for data collection to gain insights into the topic being investigated. In-depth semi-structured interviews were the main data collection method. They were conducted specifically with four seniors managers, members of the Vice-presidency of Administration and Finance of a large business at Caracas, Venezuela.

Some interviewees were met twice to clarify some events identified from other interviewees. All interviews were face-to-face and lasted up to 2 hours. Most interviews were tape-recorded and then transcribed. However, some interviewees preferred to talk in a more confidential way. In these

cases, extensive notes were taken during interviews. Semi-structured interview questions were used only as a basic guideline during the interview to make sure that all relevant topics were covered, to provide direction for questioning and to help the researcher conduct the interview in a systematic way. In most cases, supplementary questions were asked, particularly when initial responses needed elaboration or when new issues emerged in the course of discussions.

The interviews were conducted using questions covering issues such as reasons for ERP adoption, benefits achieved and changes brought in the accounting and financial processes. This paper only report findings about managerial benefits in the accounting and financial business units.

FINDINGS

An ERP system can enhance the profitability of an organization by providing numerous potential benefits. The following paragraphs provide a description of findings on the benefits in accounting and financial areas at managerial level find out in this research.

1) Quicker and Better Decision-Making: Managers interviewed called out that the ERP system improved information visibility and allow them to base their decisions on real-time information and facts, rather than on rumors or subjective opinions, and in general to change the information culture. Since the information in an ERP environment is instantaneously visible to managers at multiple levels, there is no scope or time for manipulation of the information or smoothing of its effects. Managers interviewed were agree that the ERP system allowed reduce the problems of accessibility and data quality encountered in former legacy system so improve the quality of decision making, which include flexibility in information generation and improved quality of reports. Furthermore the integration of accounting and financial applications, increased flexibility in information generation, and improved quality of financial managerial reports and decisions based on timely and reliable accounting information

2) Reconciliation/optimization of conflicting goals: In the firm where business functions are not connected via an integrated information system, conflicting goals may occur. For example, purchasing may desire and plan to build safety-stocks while accounting/finance may desire to hold inventory levels to a minimum. Similarly, marketing may have the goal of offering as much product mix variety as possible, whereas manufacturing would like to hold product variety to a minimum.. Managers interviewed agree that via ERP system they were be able to get reconciliation conflicting goals within the theirs enterprise. That is possible because an ERP system, by virtue of its single, comprehensive, enterprise-wide database should enhance the ability to reconcile and optimize conflicting goals within the organization.

3) Standardization of business processes: A "process" in a business context can be defined as the set of resources and activities necessary and sufficient to convert some form of input into some form of output. The modern business organization must deal with internal processes, external processes, and a combination of both. Furthermore, the processes cross functional boundaries and exist at all levels of the organization. For the data of the organization to be managed by one comprehensive enterprise-wide database in an efficient manner, the processes from which the data is derived should be as standardized as possible. Managers interviewed agree that using the ERP system was possible the standardization of business processes in the company.

4) Control activities: An ERP system allow to improve the procedures that protect the company's assets and prevent falsification of accounting records, for example requiring two signatures on issued checks. Controls are needed to reduce the risk that the information in the system is inaccurate, false, or has been manipulated. Managers interviewed agree that via the ERP system they can improved controls to benefit the company, since better controls allow them achieve that management's goals will be achieved. Moreover, the ERP system contribute to the downsizing and decentralization of controls and centralization of information management.

5) Audit Issues: Careful planning and analysis is necessary for consulting firms that properly perform an independent audit of an entity's financial statements. Some of the key items necessary to effectively perform an audit are obtaining a thorough understanding of the client's industry and business, performing an assessment of the risk that material misstatements. Managers interviewed expressed that the ERP system make the process of planning and execution of auditing easy and increases its reliability.

CONCLUSIONS

ERP systems have made a significant contribution by making businesses more efficient and by providing them with timely, accurate, relevant and current information for decision-making. ERP systems, with their emphasis on standardization and streamlining of procedures, and integration of information and processes, are important tools for management control.

This study has presented some evidence of ERP managerial benefits in accounting and finance from a Venezuelan firm adopting an ERP system. The interviews confirmed that , real-time information, and particularly information for decision making are the main benefits getting for accounting and financial manager using the ERP system. This further confirms that ERP systems are currently becoming a necessary tool for companies to remain competitive in this new business environment rather than constituting a new strategic move.

Furthermore the ERP system also offer the managers of this business the opportunity for the standardization of business processes, for the reconciliation and optimization of conflicting goals within the company and allow to improve the control activities. Another perceived benefits achieved following ERP implementation involve increased flexibility in information generation, the integration of accounting applications, improved quality of managerial reports and that the ERP system make the process of planning and execution of auditing easy and increasing its reliability.

REFERENCES

Booth, P., Matolcsy, Z. & Wieder, B. (2000) The impacts of enterprise resource planning systems on accounting practice – the Australian experience. *Australian Accounting Review,* 16 (1), 4-18.

Boubekri, N. (2001) Technology enablers for supply chain management*, Integrated Manufacturing Systems*, 12 (6/7), 394.

Colmenares, L. (2008) Assessing Critical Success Factors of ERP Implementation. *Encyclopedia of Information Science and Technology, 2nd. Edition*. Information Science Reference . Volume I, 248-255.

Granlund, M. & Malmi, T. (2002) Moderate impact of ERPS on management accounting: a lag or permanent outcome?. *Management Accounting Research*, 13(3), 299–321.

Irani, Z., Sharif, A.M. & Love, P.E.D. (2001) Transforming failure into success through organisational learning: an analysis of a manufacturing information system. *European Journal of Information Systems*, 10, 55–66.

Maccarrone, P. (2000) The impact of ERPs on management accounting and control systems and the changing role of controllers. *Proceedings of 23rd Annual Congress of the European Accounting Association (EAA)*, Munich, Germany.

Markus, L.M. & Tanis, C. (2000) The enterprise systems experience – from adoption to success. In: *Framing the Domains of IT Research: Glimpsing the Future Through the Past*. Zmud, R.W. (ed.). Pinnaflex Educational Resources, Cincinnati, OH. 173-207.

Nah, F.F.-H., Lau, J.L.-S. & Kuang, J. (2001), Critical factors for successful implementation of enterprise systems, *Business Process Management Journal*, 7(3), 285-96.

Scapens, R. & Jazayeri, M. (2003) ERP systems and Management Accounting Change: Opportunities or Impacts? A Research Note. *European Accounting Review*, 12(1),201-233.

Seddon, P.B., Graeser, V. & Willcocks, L. (2002) Measuring organisational IS effectiveness: an overview and update of senior management perspectives. *The Database for Advances in Information Systems*, 33, 11–28.

Spathis, C. & Ananiadis, J. (2005) Assessing the Benefits of using an Enterprise System in Accounting Information and Management. *Journal of Enterprise Information Management*, 18(2), 195-210.

Spathis, C. & Constantinides, S. (2003) The usefulness of ERP systems for effective management. *Industrial Management and Data Systems*, 103(9), 677-685.

Li, G. & Jordan, E. (1999): The Information Systems (IS) Role of Accountants: A Case Study of an On-line Analytical Processing (OLAP) Implementation. Proceedings of the American Conference in Information Systems. Paper 204.

Yin, R. (2003) *Case study research: design and methods.(Third Edition)*. Thousand Oaks, CA: Sage Publications.

STRATEGIES FOR MANAGING ORGANIZATIONAL ANXIETY WITH KNOWLEDGE MANAGEMENT

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ABSTRACT

The concept of effective Knowledge Management (KM) strategies for managing organizational anxiety is the focus of this paper. In the past, KM has been thought of as the collection of technological assets and managerial policies that compensate for information failures. Recent studies have uncovered the popularity of KM research since most large organizations have lost the potential for personal information sharing to take place.

Our work begins with the evolution of KM and many of its common practices. We continue by discussing the role of KM in managing anxiety among organizational leaders. In particular, we use the example of anxieties among leaders in colleges and universities and incorporate KM solutions with suggestions to break the destructive cycle.

INTRODUCTION

The concept of Knowledge Management (KM) has been around for decades, but most organizations accept it only as theory and have not put it into practice. It has been difficult for many firms to evolve their organizational thinking from an information focus to a knowledge focus. Throughout the past several decades, information systems practices were sufficiently developed to accomplish efficient information production. Problems arose when information was in abundance, but key individuals possessing pertinent knowledge did not or would not share it with others who stand to benefit from its discovery.

The Gartner Group, an international technology consulting group, defines KM and offers it as a discipline that encourages a mutually supported method to create, capture, organize, and use information (Duffy, 2000). From a more intuitive standpoint, it is using whatever means possible to compensate for the fact that most organizations are too big for everyone to know each other and share information at a person-to-person level (Novins, 2000). Therefore, necessary incentives must be put into place in order for KM to be viewed by firms as an asset that goes beyond the value of their available information.

In our work, we focus on the role of effective KM in the age of anxiety. In particular, many organizations are susceptible to a form of self-destruction caused by the pervasiveness of employees' anxieties. We examine this phenomenon in college and university settings and propose KM strategies that may be integrated into suggestions for reducing organizational anxiety.

REVIEW OF KNOWLEDGE MANAGEMENT

Dunn and Neumeister (2002) provide a synopsis of the evolution of KM. They postulate that instances of KM may have first been recognized around the time of World War II. It was during this time that it became evident how workers learned from experience. For instance, it was noticed that building a second airplane took considerably less time that building the first. Nobel Prize-winning economist Kenneth Arrow (1962) addressed the issue of learned experience (i.e. KM) in his article entitled "The Economic Implications of Learning by Doing." It was during this same time period that resources began to be devoted to the cause of determining significant performance variations in output within organizations.

Attempts to increase organizational learning in the 1970s and 1980s included Information Management and Total Quality Management. Another practice called the Human Capital Movement also arose during this time frame and is based on the belief that investment in individuals through education and training has a high rate of return. Although it is unclear when the term "Knowledge Management" was officially coined, its concept intensified in the 1990s. Karl Wiig (1993) authored "Knowledge Management Foundations: Thinking about Thinking – How People and Organizations Create, Represent and Use Knowledge" which was possibly the first published use of the term.

Koskinen's (2004) work categorizes KM into two components to support communication and implementation in management. First, he defines *explicit knowledge* as knowledge that can be embodied in a code or a language, and, as a consequence, can be communicated easily. The code may be words, numbers, or symbols like grammatical statements, mathematical expressions, specifications, manuals, and so forth. In addition, he defines *tacit knowledge* as knowledge based on the experience of individuals. It expresses itself as human actions in the form of evaluations, attitudes, points of view, commitments, motivation, etc. Some have summarized tacit knowledge by the phrase, "We know more than we can tell." To distinguish between the two, explicit knowledge is about *why* things work, and tacit knowledge is about *what* things work.

KNOWLEDGE MANAGEMENT CHARACTERISTICS AND ROLES

In an e-Business presentation, Novins (2002), a vice president at Cap Gemini Ernst & Young, summarized the characteristics of KM. His remarks were that good KM should have three characteristics. They are:

1. KM needs to address a real business problem that everybody agrees is a problem.
2. An organization cannot sustain a KM system without some kind of community interest or practice that provides content and accepts responsibility for continuing to build and share that content.
3. KM systems have to make it very easy for people to get the content they need.

In addition, O'Dell (2004) describes the three roles of a KM system. These roles are identified and defined as:

Knowledge Steward: One who collects, analyzes and organizes knowledge held by individuals within an organization.
Knowledge Facilitator: One who establishes connections between individuals in order to share knowledge.
Community of Practice Leader: One who sets the direction and climate for knowledge sharing in the community and ensures that the organization and the members are all benefiting from the exchange.

To successfully apply these characteristics and roles, it is important for organizations to realize that KM will not happen without sufficient resources. Such resources should be dedicated to the task of making information sharing possible.

THE AGE OF ANXIETY

If we think about organizational leaders in the midst of today's economy, certainly the term "stress" comes to mind. There are uncertainties in every organization, but uncertainty seems to be at an all-time high. If nothing else, organizations are kept off-balance with the threats of cut-backs, layoffs, and creative solutions to budgetary problems. The goal of managing organizational anxiety cannot be ignored. When employees feel chronic anxiety, they will operate on emotions rather than principles. They lose the ability to think clearly and rationally. (Miller, 2008). It is true that some anxiety is normal and possibly desirable because it is a natural response to ensure one's survival. It is also true that anxiety is contagious, spreading through organizations like wildfire and causing a chain reaction of emotional unrest. While emotions flare, real issues are rarely addressed.

ANXIETY IN COLLEGES AND UNIVERSITIES

Certainly, this premise could be applied to organizations or institutions of all types. We choose to focus on the dynamics of organizational anxiety in colleges and universities. The continuous drive for improvement and accountability in education makes it a prime example of the need for knowledge repositories. Government funding for education at all levels is tightening while there is increased pressure for improvement and assessment of student outcomes (Miller, 2002; Ewell, 2002). Colleges and universities, as well as primary and secondary schools are being called to a higher level of accountability in terms of the mission and needs of students. These increasing demands lead to unnatural levels of stress and anxiety. Solutions to anxiety issues in colleges and universities often lie in the inability of leaders to overcome knowledge barriers.

Educational institutions frequently employ an information architecture that is disjointed and counterproductive, not unlike the business environment (Petrides and Guiney, 2002). Combined with the above barriers are the issues of asynchronous "technology culture" and "information culture." Many colleges, universities and schools are pouring millions of dollars into information technology without considering how to effectively integrate those technologies into shared decision-making processes to improve academics, operation and planning.

ACCREDITATION AND THE IMPACT OF KNOWLEDGE MANAGEMENT

There are several different accrediting organizations in the U.S., and universities and colleges may be accredited by just one or by a few different organizations. For example, two accrediting organizations affiliated with the authors' university are the Southern Association of Colleges and Schools (SACS) and The Association to Advance Collegiate Schools of Business (AACSB). Justification for the attainment of accreditation standards is a knowledge intensive process. Not only are assessments made on curricula and attainment of educational objectives, but qualifying criteria must be met by faculty as well. Since accreditation (or reaffirmation of accreditation) examines colleges and university over a window of time, there must a mechanism in place to capture pertinent information and transform it into a knowledge-rich repository.

KM ACCREDITATION TOOLS TO BREAK THE ANXIETY CYCLE

Continuing with the phenomenon of organizational anxiety, solutions to this problem have been discussed in recent literature (Miller, 2008). They include the following:

1. Strive to be a predictable leader.
2. Map the anxiety in your situation.
3. Learn to take an "I-position."
4. Calm yourself with a six-second vacation.
5. "De-triangle" yourself.
6. Correct and overfunctioning/underfunctioning relationship.

In studying the above-mentioned solutions for diminishing organizational anxiety, two of these solutions have the potential to be executed through effective knowledge management. We further examine the goals of 1) striving to be a predictable leader and 2) correcting overfunctioning/underfunctioning relationships. An example of the integration of anxiety reducing strategies with knowledge management tools is the case of the processes for accreditation of colleges and universities.

A common problem in preparation for an accreditation team is providing insightful knowledge concerning a university's mission, goals, and objectives. This is by nature a knowledge intensive process. The burden is usually put upon administration to produce reports which validate that accreditation standards have been met. It is very easy for those in leadership positions to jump from rational system standards to emotional behavior when they are put under pressure. Thus, a leader's management style becomes unpredictable. A structured methodology is needed for the attainment of knowledge. Knowledge should be extracted in a consistent manner across all departments involved. In addition, the knowledge gathering tools should keep certain individuals from entering an overfuntioning mode while others are content to sit back and carry little or none of their fair share of the burden.

CONCLUDING REMARKS

Having gained insight into the study of KM and its inverse relationship with the amount of anxieties found in organization, our work provides a theoretical foundation for the development of future strategies. We hope to continue to examine tools and methodologies to easily extract knowledge in colleges and universities. We will also further explore the issue of organizational anxieties and suggest further strategies for its reduction. Our quest is still found in that which was stated by Novins (2002), "The solution isn't creating the world's greatest database repository of all wisdom with the world's fanciest search engine. Instead, we need to give people specific tools designed to help them do their job and solve specific business problems." Hopefully, those in higher education will be enlightened to see that they possess the knowledge to create situations that enhance not only their own performance, but the performance of their colleagues and the productivity of the institution as a whole.

REFERENCES

Arrow, K. (1962). The economic implications of learning by doing. *Review of Economic Studies*, 29(June), 155-173.

Duffy, J. (2000). Knowledge management: To be or not to be? *Information Management Journal*, 34(1), 64-67.

Dunn, J. & Neumeister, A. (2002). Knowledge management in the information age. *E-Business Review*, Fall, 37-45.

Ewell, P. T. (2002). Grading student learning: You have to start somewhere. *Measuring Up 2002: The State-by-State Report Card for Higher Education*. National Center for Public Policy and Higher Education: San Jose, CA.

Koskinen, K. (2004). Knowledge management to improve project communication and implementation. *Project Management Journal*, 35(2-June), 13-19.

Miller, J. (2008). Leading in the age of anxiety: Six ways to manage your own anxiety, calm down your employees. . . *IEEE Engineering Management Review*, 36(3), 91-93.

Miller, M. A. (2002). Measuring up and student learning. *Measuring Up 2002: The State-by-State Report Card for Higher Education*. National Center for Public Policy and Higher Education: San Jose, CA.

Novins, P. (2002). Knowledge management for competitive advantage and shareholder value. *E-Business Review*, Fall, 33-36.

O'Dell, C. (2004). *The executive's role in knowledge management*. American Productivity and Quality Center: Houston, TX.

Petrides, L. A. & Guiney, S. (2002). *Knowledge management for school leaders: An ecological framework for thinking schools*. Teachers College Record, 104(8), 1702-1717.

Wiig, K. M. (1993). *Knowledge management foundations: Thinking about thinking. How People and Organizations Create, Represent and Use Knowledge*. Volume 1 of Knowledge Management Series. Schema Press: Arlington, TX.

BUILDING A SUPPLY CHAIN MANAGEMENT PROGRAM: WHERE DOES THE MULTI-DISCIPLINARY DEGREE FIT IN A BUSINESS SCHOOL?

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ABSTRACT

Supply Chain Management (SCM) is an area of growing interest in both the academic setting and industry. A number of new textbooks are available for courses in the area, and a number of Colleges of Business are adding relevant curriculum. However, questions arise as to what SCM comprises, as to needed courses in the area, and an appropriate delineation as to which department is best suited to house such a program.

We investigate some of the issues business educators might face in an effort to initiate a new degree program in SCM. In our work, we present the SCM movement, the primary disciplines that support SCM, and an example method for program construction.

INTRODUCTION

Supply Chain Management (SCM) has emerged as an important activity among business organizations. At least one expert views Wal-Mart's approach to logistics in retail as a more significant innovation than the invention of the transistor (Webster, 2008). As is often the case with innovation and change in business organizations, the academic world is playing "catch-up" when offering curricula in SCM. Because SCM is a "multi-disciplinary" field of study that crosses the boundaries of traditional business disciplines, academicians from different areas have been drawn into the SCM arena. Textbooks in the fields of purchasing, logistics and operations management are increasingly using the term "Supply Chain Management" in titles.

An important issue appears to be where courses supporting an SCM program would best fit in business school curricula, or specifically, which department would best manage such a program. Conventional departmental organization of business schools in the late 20th century (Accounting, Economics, Finance, Management, Management Information Systems, and Marketing) presents a conundrum as to the best location for an SCM program. Being the mixture that it is, SCM may not fit completely into any of these specific departments, which presents a dilemma. SCM in application is cross functional, processed-based, boundary-spanning activity (Bowersox et. al., 2007)

To continue, our work examines the issues associated with the emergence of SCM in business education. The movement and problems associated with defining SCM is explored. Additionally, steps necessary in developing a new degree program in the discipline are presented.

WHAT IS SUPPLY CHAIN MANAGEMENT?

The term *supply chain management* may have first appeared in a 1982 *Financial Times* article (Webster, 2008). Many have defined SCM over the years, and as time has marched forward several of the definitions have changed to include a variety of business related functions. Some of the most recent definitions include:

> *Supply Chain Management involves the management of activities surrounding the flow of raw materials to the finished product or service enjoyed by end customers and back in the case of recycling or return (Webster, 2008).*
>
> *Supply management is the process of identifying, evaluating, selecting, managing and developing suppliers to realize supply chain performance that is better than that of competitors (Monczka et. al., 2009).*

If defined broadly enough, SCM includes all functional areas of business and several areas from outside of business. Consider that a supply chain may be described as a business entity in which two or more organizations are linked by a flow of goods, funds, and information and may be global in scope. This could include everything from the raw materials used in manufacturing to the delivery of the product to the final consumer, and all activities in between. It not only includes organizations, but also their suppliers, buyers, vendors, customers, and others with whom it interacts.

REQUIRED SCM CAREER SKILLS AND THE DISCIPLINES THAT SUPPORT THEM

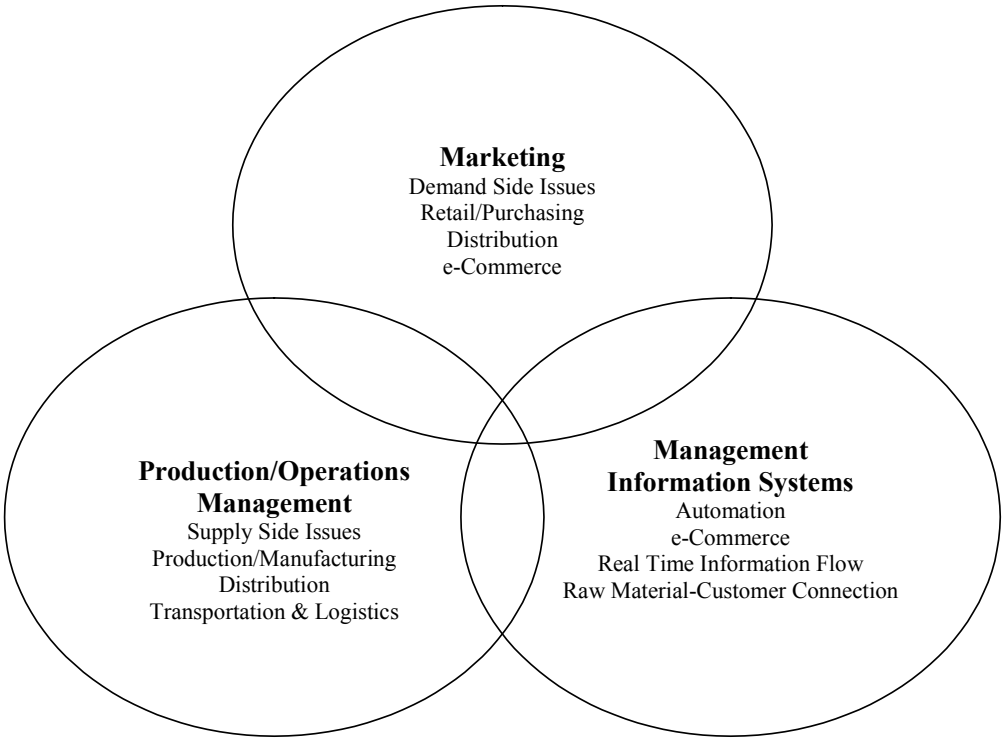
An industry group, the *Council of Logistics Management*, notes the required skills necessary for a career in SCM. Those skills include:

1. Possess a strong quantitative and analytical background.
2. Be familiar with logistics and production planning concepts.
3. Possess a broad range of computer skills.
4. Understand contracts and tariffs.
5. Be self directed and have the ability to communicate findings.
6. Be able to make recommendations and facilitate change.
7. Be comfortable working with individuals at all organizational levels.
8. Possess project management skills.

Thus, SCM is a multi-disciplinary field primarily made up of Marketing, Production/Operations Management and Computer Information Systems. (See Figure 1 below for an illustration.) It emphasizes cross-functional links and seeks to manage those links to enhance a

company's competitive advantage. In doing so, it requires skills related to *forecasting*, *resource allocation*, *production planning*, *flow and process management*, *inventory management*, *customer delivery*, *after-sales support and service*, and a host of other activities and processes familiar and basic to business where competitive pressures are intense.

Figure 1: The Core Disciplines of Supply Chain Management



THE SCM MOVEMENT

Organizations can no longer achieve high performance results by focusing on the traditional functions of Marketing, Production/Operations Management and Computer Information Systems separately. Today's high performance organizations fully integrate procurement, production, logistics, information systems and marketing functions both within the firm and across firms. In fact, the trend goes beyond integration of functions within the firm and focuses on the entire set of firms that move a product from inception to the end user.

SCM has received quite a bit of attention from industry in recent years. So significant have the changes in distribution been that the area is commonly referred to as the "supply chain revolution" (Bowersox et. at., 2007; Burt et. al., 2005). It is commonly acknowledged that the single

most important factor separating Wal-Mart from other retailers is the organization's ability to manage its supply chain. Wal-Mart announced last year that it would need 6,000 new managers in its logistics division.

The SCM concept is pervasive in manufacturing as well (Kahn, 2004). As manufacturers have outsourced and become global, logistics has assumed a more important role (Dean, 2005). In the next 10 years, U.S. railroads will invest more in new rail lines than they did in the last 100 years (Machalaba, 2008). Panama is expanding its canal to handle larger ships from Asia, and the container traffic coming through Louisiana ports from the Gulf of Mexico is expected to triple by 2013 according to the Port of New Orleans.

AN EXAMPLE PROGRAM DESIGN PROCESS

Providing SCM programs to serve the needs of students and industry alike requires substantial effort. While the actual steps to create a program may vary from university to university, most will require the following:

1. **Determine Need**: Perform environmental scanning within the region to determine industry support.
2. **Bring University Administrators "on-board"**: Garner university administration support – look for a "project champion."
3. **Create an Industry Advisory Board**: Industry members assist with course development and design, and are essential if the program is to be effective.
4. **Develop Faculty Linkages**: Engage inter-disciplinary faculty who will eventually drive the program.
5. **Develop New Courses** (if needed): Advisory board members will more than likely suggest new courses (and skills) to be offered by the program.
6. **Submit a Letter of Intent**: University administration must request permission from their governing body to propose a new degree program.
7. **Submit a Formal Proposal**: Upon approval of the Letter of Intent, university administration will submit a formal proposal for the new degree program which will be reviewed by the appropriate committees and consultants for feedback. Revisions are likely.
8. **Implement New Program**: Beyond providing students and industry leaders with new opportunities, other tasks remain. Changes to the University Catalogue, Bookstore, Enrollment Services, etc. all need to be completed for total program implementation.

RECOMMENDATIONS

It is recommended that Colleges of Business that have not yet initiated a curriculum in SCM consider offering such a program soon. However, as with any new program, cost considerations and local market needs may dictate the reality for any one institution. Marketing, Production and

Operations Management and Computer Information Systems are all often found in many business curricula. Thus, existing faculty may be called upon to initiate an SCM program.

A final recommendation in creating an SCM program is to involve local SCM organizations and their managers from the beginning. Many are eager to support and encourage such programs. At the authors' college, a regional transportation organization has provided significant funding in support of its program to purchase equipment, provide internships and scholarships, and provide faculty development activities. These activities have all been a result of the desire of local transportation and SCM professionals to further their firm's interests through the education and development of future SCM professionals.

REFERENCES

Bowersox, D., Closs, D. and Cooper, M. (2007). *Supply Chain Logistics Management*, 2nd edition, McGraw-Hill Irwin, Boston: Massachusetts.

Burt, N., Dobler, W. and Starling, S. (2003). *World Class Supply Management*, McGraw-Hill Irwin, Boston: Massachusetts.

Dean, J. and Tam, P. (June 2005). The Laptop Trail; The Modern PC is a Model of Hyperefficient Production and Geopolitical Sensitivities, in *The Wall Street Journal* (Eastern edition). New York City: New York, p. B.1.

Kahn, G. (August 2004). Making Labels for Less; Supply-Chain City Transforms Far-Flung Apparel Industry; Help for 'the Button Guy,' in *The Wall Street Journal* (Eastern edition). New York City: New York, p. B.1.

Machalaba, D. (February 2008). New Era Dawns for Rail Building; Lines Add Tracks, Upgrade Tunnels To Take On Trucks, in The Wall Street Journal (Eastern edition). New York City: New York, p. A.1.

Monczka, R., Handfield, R., Giunepero, L., and Patterson, J. (2009). Purchasing and Supply Management, 4th edition, SouthWestern/Cingage, Mason: Ohio.

Webster, S. (2008). *Principles of Supply Chain Management*, McGraw-Hill Irwin, Boston: Massachusetts.

FACTORS INFLUENCING STUDENT PERFORMANCE IN THE INTRODUCTORY MANAGEMENT SCIENCE COURSE

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ABSTRACT

The introductory management science course is a core requirement for many undergraduate students majoring in business. In general, it is considered to be a challenging course having high withdrawal and failure rates. The purpose of this paper is to examine factors that influence the performance of students in the introductory management science course. To evaluate these factors, a study was conducted over a two-year period covering around 300 students from business and other majors at Hampton University, Hampton, Virginia. Several independent variables related to student demographics, course structure, instructional methods, student motivation and effort, student aptitude and application, and student preparation were considered. Nine of these variables showed some significant relationship with the performance. Furthermore, a multiple regression model was constructed using stepwise method. Four independent variables were included in the final regression model: current class grade point average, average homework score, course utilization ratio, and completion of pre-calculus prerequisite. The final multiple-regression model explained around 51% of the variation. The results emanating from this paper could assist in re-designing and delivery of management science course material.

INTRODUCTION

There is a growing concern about the poor performance of undergraduate students in the introductory management science course, which is a core requirement in most business degree programs and a prerequisite for advanced courses. At Hampton University, business students are required to earn a C grade or higher in this course (Quantitative Methods) to fulfill graduation requirements. The number of students not meeting this requirement in their first attempt is high, with approximately one-third of the students earning less than a C grade, thus having to repeat the course. This exerts a financial strain on the students, lowers overall GPA, delays graduation, and causes overcrowding of management science classes.

The main motivation behind this study is to establish the underlying causes of higher failure rate in this course. The literature review shows that statistical techniques are extensively applied to model student academic performance in several courses. A number of researchers used statistical models to study factors influencing performance in accounting, economics, and finance courses. However, there is a lack of application of similar statistical techniques to analyze performance in management science courses. A small number of recent studies have been reported which analyze students' performance in such courses. Furthermore, these studies do not necessarily agree on the

reasons for poor performance. Grossman (2001) provided several reasons for poor performance ranging from student lack of preparation to ineffective course design. Brookshire and Palocsay (2005); Peters et. al. (2002); and Mukherjee (2000) have studied management science courses and arrived at somewhat different causes of poor performance. This indicates that further investigation may be necessary to understand the root causes of poor performance and recommend corrective measure to improve students' performance in the management science course.

The study initially considered a wide range of independent variables that could possibly influence the performance. Preliminary statistical tests resulted in elimination of the non-significant variables. A multiple regression model was developed relating nine independent variables to student performance measured by the simple average of tests and final examination scores. A final multiple regression model was created using stepwise method resulting in four independent variables as a predictor for student performance. These four variables were current class grade point average, average homework score, course utilization ratio (ratio of total hours earned by total hours attempted), and completion of precalculus prerequisite.

RESEARCH DESIGN AND RESULTS

The Course Details and Sample Size. The course studied for this research was a three credit hour introductory management science course required by all business majors and used as an elective by students from other majors. This sophomore level course is sequenced during the fourth semester and requires calculus and statistics prerequisites. The classes were taught by a single tenured professor on Monday, Wednesday, and Friday between 8:00 AM and 11:00 AM. A common course syllabus and grading scale was used covering deterministic and probabilistic models outlined in the sample course design by Borsting et. al. (1988). Powerpoint presentation was used as a teaching tool in all sections and made available electronically to students. The final score was complied as a weighted sum of three tests (45%), final examination (20%), homework (10%), quizzes (10%), class project (10%), and attendance/participation (5%). A course grade was assigned according to the University's grading system. The tests and final examination consisted of a combination of multiple-choice questions (30%) and numerical problems (70%). Homeworks and quizzes were assigned at the end of each chapter and were graded and returned back to students. The class project demonstrated an application of a management science technique covered during the course. The attendance/participation score was computed based on the number of unexcused absences. The course was studied over a two-year period covering 333 students in 10 sections taught during the fall 2005 to spring 2007 semesters. Out of 333 students, 297 were assigned a letter grade from A through F. The remaining 36 students (around 11%) withdrew from the course, or did not take the final exam.

Preliminary Statistical Analysis. The methodology follows the approach of Eikner and Montondou (2001). The variables identified in the literature review were analyzed separately in relation to performance using the t-test, ANOVA, and/or simple regression, and significant variables were included in the multiple regression model. Instead of using the final grade for performance measure as suggested by Eikner and Montondou (2001), or the final examination score (Sugahara and Boland, 2006), this study used the simple average of the three tests and final examination scores (AVGT). The tests and final examination, from which the AVGT is computed, are conducted in

class under supervision and hence, expected to reflect the true performance of students. Trautwein and Köller (2003) have also recommended the use of *standardized achievement tests* instead of grades to measure the performance of students.

Student Demographics (major, age, gender, and race). The student population included largely business majors along with a few non-business majors. An ANOVA test showed no significant difference (F=1.638, df=296, p=.1499) in AVGT for the different majors. Most of the students in the study group were African-American sophomores or juniors residing on campus. Since the sample was largely homogenous with respect to age and race, these variables were not analyzed further. The females outnumber males (54% versus 46%) reflecting a national trend of higher enrollment of female college students. The AVGT scores for female and male differ significantly (t = 2.621, p = .009) suggesting that female students' performance was significantly better than male students in the course. Based on the preliminary statistical analysis of student demographics, only the independent variable GENDER is included in the multiple regression model.

Course Structure (class size, duration, timing, and length). Due to limited data sets, the class size was divided into two groups: small class (= 30 students) and large class (> 30 students). The AVTG for small and large classes is not significantly different (t = -.994, p = .321). All the classes were held on Monday, Wednesday, and Friday at 8:00 AM, 9:00 AM, 10:00 AM, and 11:00 AM for a duration of 50 minutes each. The t-test for sample pairs of different class meeting timings show no significant difference (t = -0.009, p = 0.993 to t = -1.594, p = 0.118) in the AVTG. Similarly, there was no difference found between Fall and Spring semesters' AVTG (t= -.1965, p=.8442). The class length and semester duration variables could not be tested as all 10 sections considered in the study met for 50 minutes each in the regular 15-week semester. Based on the preliminary statistical analysis of course structure, none of the independent variables in this set were significant.

Instructional Methods (instructor status, presentation style, and textbook.) All the sections were taught by a single tenured professor using Powerpoint presentation. The presentations were available electronically to students through the University website. Since, all sections were taught by same professor using similar presentation style, the instructor status and presentation style variables could not be tested. The prescribed text book for the course was changed in the Fall 2006. A t-test for the two sample courses using the old book in Spring 2006 and the new book Spring 2007 showed no significant differences in AVGT (t = - .639, p = .525.)

Based on the preliminary statistical analysis of instructional methods, none of the independent variables in this set were significant.

Student Motivation and Effort (attendance, homework, and quizzes.) Class attendance was required and constituted part of the final grade. A simple regression analysis conducted separately for the number of days absent and percentage of days absent showed a significantly high (p<.001) relationship on the AVGT. The percentage of days absent had a stronger relationship (r-square = 0.09) with AVGT. Homework was assigned at the end of each chapter to strengthen learning of conceptual and quantitative materials. All homework were collected, graded by the instructor, and returned back to the students. A simple regression analysis conducted separately for the number of homework submitted, percentage of homework submitted, and the average homework score showed a significantly high (p<.001) relationship with AVGT. The average homework score had a stronger relationship (r-square =.238) with AVGT. A short quiz followed the completion of each chapter. These were completed outside the classroom and were collected during the next class meeting,

graded by the instructor, and returned back to the students. A simple regression analysis conducted separately for the number of quizzes submitted, percentage of quizzes submitted, and the average quiz score showed a significantly high ($p<.001$) relationship with AVGT. The average quiz score had a stronger relationship (r-square =.146) with AVGT. As expected, all the motivation and effort variables were significant in the preliminary statistical analysis.

Student Aptitude and Application (SAT, current class GPA, and course utilization ratio.) According to the business curriculum outline, all students must enroll in the Quantitative Methods course preferably during their sophomore year after completing at least 45 semester credit hours. An analysis of average hours attempted (96.65 hours) and the average hours earned (89.29 hours) up to completion of the course indicates that students were enrolling in this course much later in their curriculum, some even during their final semester. A number of students earned transfer credit hours that are included for total curriculum requirement but not included in the hours attempted and hours earned for class GPA computation. Hence, it was decided to compute the course utilization ratio of total hours earned to total hours attempted (HE/HA). This average value of HE/HA for this study was = 0.937 indicating a loss of hours due to withdrawal or failing grades. The current class GPA (including the Quantitative Methods course) and the course utilization ratio are reflective of the student's aptitude and application. A simple regression conducted separately for the current class GPA and course utilization ratio on AVGT, showed the former had a significant relationship (r-square =.404, $p<.001$) and the latter had a significant relationship (r-square = .119, $p<.001$). The GPA and course utilization ratio has significant relationship with AVGT indicating that higher values should lead to better performance. Hence, current class GPA (GPA) and course utilization ratio (HE/HA) were included in the regression model.

Student Preparation (prerequisites, transfer, and course repetition). The curriculum requires two prerequisite courses in calculus and statistics to be completed prior to enrolling in the Quantitative Methods course. The AVGT for students who completed the Calculus and Statistics prerequisites earning a passing grade were significantly higher than students who did not complete the prerequisites. The completion of Precalculus Mathematics I course which is a prerequisite for the Calculus as well as Statistics courses also had a significant impact on the AVGT. The School allows students to transfer non-business course credits (not quality points) completed at any accredited institution of higher learning. The focus of this research was on students who obtained transfer of the prerequisite MAT 130 - Calculus. There was no significant difference ($t=-.821$, $p=.417$) in AVGT between students who completed the calculus course on campus or at another institution. This contradicts results of Munro (2001). Student repeating the course either withdrew from the previous course or received a lower grade than is necessary for their curriculum. There was no significant difference ($t=1.186$, $p=.236$) noted in AVGT between repeat and first time students. A similar analysis by Eikner and Montondon (2001) found marginal difference in performance.

Multiple Regression Analysis. Of the 22 independent variables analyzed by preliminary statistical methods, nine significant independent variables were included in the following multiple regression model.

$$AVGT = \hat{a}_0 + \hat{a}_1 GPA + \hat{a}_2 GENDER + \hat{a}_3 \%ABS + \hat{a}_4 AHW + \hat{a}_5 AQZ + \hat{a}_6 HE/HA + \hat{a}_7 P1 + \hat{a}_8 P2 + \hat{a}_9 P3 + \mathring{a}$$

Dependent variable. AVGT: the simple average scores of tests and final examination.
Independent Variables. GPA: a continuous variable representing the current class GPA up to completion of the Quantitative Methods course.

GENDER: a dummy variable, Male = 1, Female = 0.
%ABS: is a continuous variable representing the percentage of days absent.
AHW: a continuous variable representing the average homework score out of 10.
AQZ: a continuous variable representing the average quiz score out of 10.
HE/HA: a continuous variable representing course utilization ratio (total hours earned by total hours attempted) up to completion of the Quantitative Methods course.
P1: a dummy variable for Calculus prerequisite. Completed = 1, not completed = 0.
P2: a dummy variable for Statistics prerequisite. Completed = 1, not completed = 0.
P3: a dummy variable for Precalculus Mathematics I prereq. Completed = 1, not completed = 0.

An analysis was conducted to determine the equation of the multiple regression model that best fits the data. The computed value of $F = 34.214$ and the P-value < 0.001 indicates that some of the independent variables have the ability to explain the variation in AVGT.

It was shown that contribution of some variables is mostly explained by the other variable, as the regression model only considered variables which independently showed significant relationship with AVGT. For example, Precalculus Mathematics I (P3) is a perquisite for both Statistics (P2) and Calculus (P1). And the regression model shows that completion of P3 explained most of the variability as compared to the prerequisites P1 and P2. It is possible that a number of students who completed P3 had also completed P1 and P2 courses. Furthermore, a correlation matrix was developed showing the coefficient of correlation between pairs of independent variables. All the variables except GENDER and P2 appear to have a medium to strong correlation with AVGT. GPA has the strongest relationship and GENDER and %ABS have negative signs indicating an expected inverse relationship. A check for multicollinearity was conducted to determine if there was any correlation among the independent variables.

Stepwise Regression. As described in the earlier section, not all nine variables are contributing significantly to multiple regression model. The stepwise multiple regression (SPSS, Inc., 2003) was used to find the better and concise regression model from the set of independent variables under consideration. The final multiple regression model (Mode 4) is:

$$AVGT = 67.847 + 13.303GPA + 1.213AHW - 40.721HE/HA + 3.666P3.$$

CONCLUSIONS

This study includes an exhaustive literature review of possible factors that could influence the performance of students in the management science (Quantitative Methods) course and identified around 22 such factors. After a preliminary statistical analysis, nine of these factors were included as independent variables in the multiple regression model. A stepwise regression analysis resulted in four significant ($p < 0.001$) variables: GPA, AHW, HE/HA, and P3. The remaining five factors although having influence did not independently contribute significantly to the predictive model.

An objective of this paper is to provide guidelines that may be used by faculty while advising students. Faculty teaching the Quantitative Methods course could do a prior analysis of student background to predict performance. The data for the independent variables could be drawn for the current semester and fitted to the final multiple regression model. The class GPA (GPA), course utilization ratio (HE/HA), and completion of prerequisite (P3) is available from student transcripts. The average homework score (AHW) will not be available at the beginning of the semester but a conservative estimate could be used. Student whose performance falls below normal could be advised to take appropriate action such as strengthening basic math skills, seeking tutorial help, improving study habits and class attendance, etc.

REFERENCES: Provided upon request.

OPTIMAL ORDER QUANTITY FOR IMPERFECT QUALITY ITEMS

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ABSTRACT

The classic economic order quantity (EOQ) model assumes that all items received from a supplier are of perfect quality. This paper considers an inventory situation where some of the items received are of imperfect quality but not defective. The imperfect quality items are sold at a discounted price and the demands for both perfect and imperfect quality items are continuous during the inventory cycle. The EOQ formulae are extended by accounting for imperfect quality items. The mathematical model is developed and a numerical example illustrating the determination of the optimal policy is provided.

KEY WORDS: Optimal order quantity, imperfect items, screening.

INTRODUCTION

The underlying assumptions of the economic order quantity (EOQ) model are rarely met in real-life situations. In order to provide models that closely describe actual inventories and account for the factors that influence the inventory costs, the simplified assumptions of the EOQ model must be modified. One of the assumptions of the classical EOQ model is that all items received from a supplier are of the perfect quality. This is not always the case in real life. Considerable research has already been done on inventory models where the assumption of perfect quality items is lifted. (Porteus, 1986) incorporated the effects of defective items into the basic EOQ model. (Schwaller ,1988) proposed an EOQ model with the assumptions that defectives of a known proportion were present in incoming lots and that fixed and variable inspection costs were incurred in finding and removing the items. (Zhang & Gerchak, 1990) investigated the case where the defective items are replaced by non-defective ones. (Cheng, 1991) presented a model where the production processes is imperfect and the unit production cost is demand dependent. More recently, (Salameh & Jaber, 2000) developed a model to determine the optimal lot size where each lot delivered by the supplier contains imperfect items with a known probability density function. Items of imperfect quality detected in the screening process of a lot are sold in one batch at a discounted price. (Hayek & Salameh, 2001) studied the production lot sizing with the reworking of imperfect quality items. (Chiu, 2003) determined the optimal lot size for the finite production model with random defective rate, a reworking process, and backlogging. (Ozdemir, 2007) examined an EOQ model where each ordered lot contains some defective items and shortages backordered. (El-Kassar & Salameh, 2008), studied an economic production quantity model where the items produced are of two qualities. This paper considers an EOQ model where a proportion of the items received are of imperfect quality but not defective. The imperfect quality items are sold at a discounted price and the demands for both perfect and imperfect quality items are continuous during the inventory cycle.

THE MATHEMATICAL MODEL

The following notation is used to develop the proposed inventory model.

y = Quantity ordered
β_p = Demand rate of perfect quality items
β_i = Demand rate of imperfect quality items
β = Combined demand rate, $\beta = \beta_p + \beta_i$
q = Percentage of perfect quality items received
$1 - q$ = Percentage of imperfect quality items received
K = Set up cost per inventory cycle
h = Holding cost per unit per unit time
C = Unit purchasing cost
C_s = Unit screening cost
S_p = Unit selling price for perfect quality items
S_i = Unit selling price for imperfect quality items
t_0 = Total inventory cycle length
t_p = Perfect quality items inventory cycle length
t_i = Imperfect quality items inventory cycle length

The classical EOQ model describes the situation where a certain item is ordered at a unit cost C to meet the demand. If the demand rate is a constant β, K the setup cost and h the holding cost, then the total inventory cost per unit time function TCU is given by

$$TCU(y) = K\beta/y + C\beta + hy/2, \quad (1)$$

where y is the order quantity. The optimal order quantity or the economic order quantity $y^* = \sqrt{(2KD/h)}$. The behavior of the classical EOQ model is illustrated in Fig. 1.

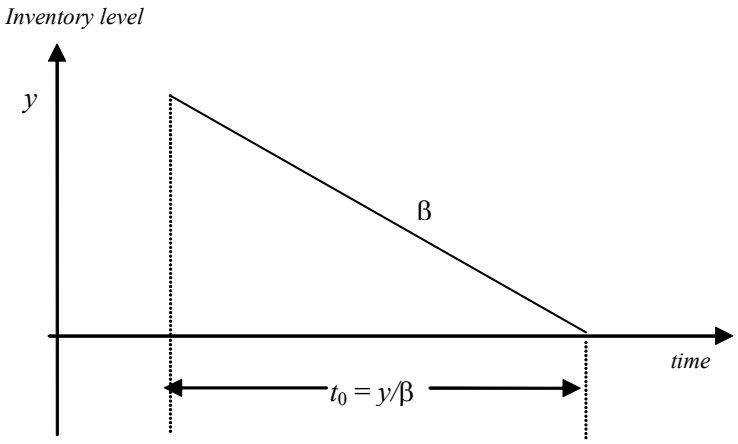

Fig. 1 : The classical economic order quantity model

The classical economic order quantity model assumes that 100% of the items received from a supplier are of perfect quality. This is not always the case in real life. Due to deterioration or other factors, the production process may shift and produce some items of imperfect quality. The items of imperfect quality could be sold at a discounted price. Good examples of such situations are found in the electronics industry.

Consider the case where an order of size y is received instantaneously with a unit purchasing cost of C and an ordering cost of K. Suppose that the items received contain a percentage q of perfect quality. The unit selling price of perfect quality items is S_p. The perfect quality items are identified by conducting a 100 % screening process. The imperfect quality items are sold at a discounted price of S_i per unit. The demands for both types are continuous during the inventory cycle. Let β_p and β_i be demand rates of perfect and imperfect quality items, respectively. Then the combined demand rate of both types is $\beta = \beta_p + \beta_i$. We assume that the screening time per unit is negligible so that the demands of both types are met. The behavior of the different inventory levels are illustrated in Figures 2, 3 and 4.

During each inventory cycle, the number of perfect quality items received is qy and $t_p = qy/\beta_p$. Similarly, the number of imperfect quality items received is $(1-q)y$ and $t_i = (1-q)y/\beta_i$. The combined inventory cycle for both types of items depends on the larger value among t_p and t_i. During the combined cycle, inventory is depleted at a rate of β until items of either quality are out of stock; i.e., at time $t = \min\{t_p, t_i\}$. After time t, inventory is depleted at a rate of β_p or β_i. In the case when $t_p \geq t_i$, we have that $qy/\beta_p \geq (1-q)y/\beta_i$, which is equivalent to $q\beta - \beta_p \geq 0$. The imperfect quality items will be sold out at time t_i, and the combined inventory is at a level of

$$y - t_i\beta = y - (1-q)y\beta/\beta_i = (q\beta - \beta_p)y/\beta_i. \qquad (2)$$

The economic order quantity is determined by maximizing the total profit per unit time function. The total profit function per cycle is $TP(y) = TR(y) - TC(y)$, where $TR(y)$ and $TC(y)$ are the total revenue and the total cost per cycle functions, respectively. The total revenue function is

$$TR(y) = S_p q y + S_i(1-q)y. \quad (3)$$

The function $TC(y)$ consists of four the following components:

Purchasing cost = $C\,y$
Screening cost = $C_s\,y$
Setup cost = K
Holding cost = (area under the curve)× (holding cost per unit per unit time)

The area under the curve is the sum of the two areas: from time 0 to $t = t_i$ and from t_i to t_p. Therefore,

$$Area = \tfrac{1}{2}.t_i\,(y + (t_p - t_i)\beta_p) + \tfrac{1}{2}.(t_p - t_i)(t_p - t_i)\beta_p. \quad (4)$$

Substituting t_p and t_i by their values in (4) and simplifying, we get

$$Area = \tfrac{1}{2}.y^2[(1-q)\beta_p\beta_i + (1-q)(q\beta - \beta_p)\,\beta_p + (q\beta - \beta_p)^2]/\,(\beta_p\beta_i^2). \quad (5)$$

From (2), (3) and (5), we have that the total profit per cycle function is

$$TP(y) = S_p q y + S_i(1-q)y - C\,y - C_s\,y - K$$
$$-\tfrac{1}{2}.h.y^2[(1-q)\beta_p\beta_i + (1-q)(q\beta - \beta_p)\,\beta_p + (q\beta - \beta_p)^2]/\,(\beta_p\beta_i^2). \quad (6)$$

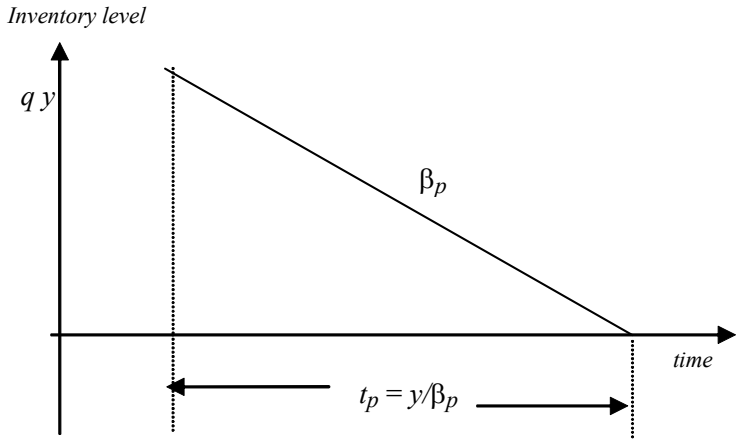

Fig. 2 : The inventory level of the perfect quality items

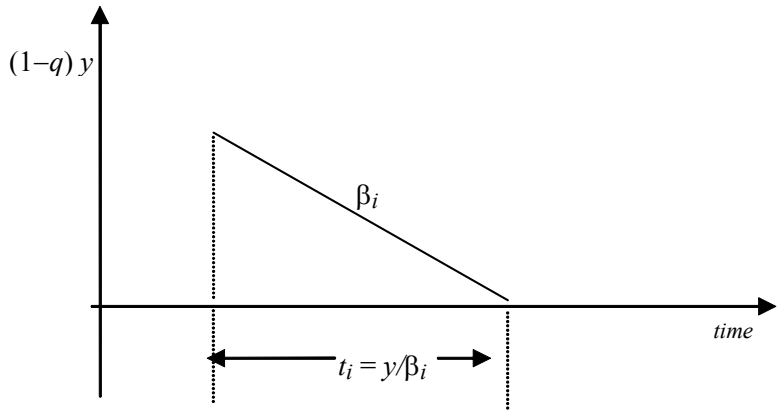

Fig. 3 : The inventory level of the imperfect quality items

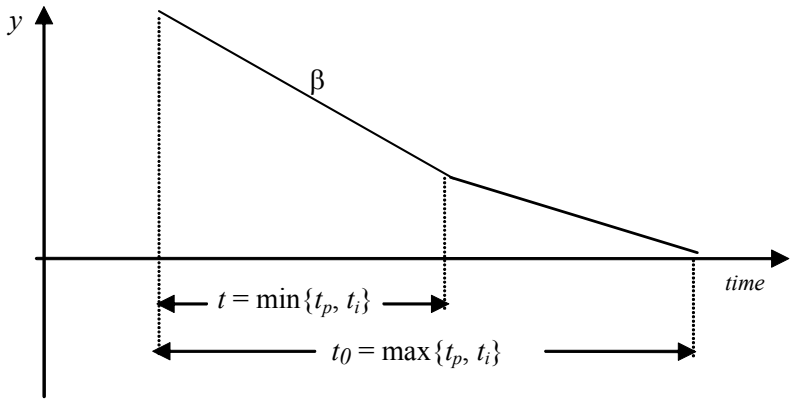

Fig. 4 : The combined inventory level of perfect and imperfect quality items

The total profit per unit time function is obtained by dividing (6) by the $t_p = qy/\beta_p$. Hence,

$$TP(y) = S_p\beta_p + S_i(1-q)\beta_p/q - C\,\beta_p/q - C_s\,\beta_p/q - K\beta_p/(qy)$$
$$-\tfrac{1}{2}.h.y[(1-q)\beta_p\beta_i + (1-q)(q\beta-\beta_p)\,\beta_p + (q\beta-\beta_p)^2]/(q\beta_i^2). \qquad (7)$$

The economic order quantity is obtained by setting the derivative of $TPU(y)$ in (7) equal to zero and solving for y. The economic order quantity is

$$y^* = \sqrt{2K\beta_p\beta_i^2}\,/\,(h.[(1-q)\beta_p\beta_i + (1-q)(q\beta-\beta_p)\,\beta_p + (q\beta-\beta_p)^2]) \qquad (8)$$

A similar expression can be obtained for the case when $t_i > t_p$. Note that the second derivative of total profit per unit time function is $TPU(y)$ is $-2K\beta_p/(qy^3) < 0$. Therefore, the $TPU(y)$ is convex and y^* is its unique minimize.

NUMERICAL EXAMPLES

Consider the situation where the percentage of perfect quality items received is 90%. The annual demand rate for the perfect quality items is $\beta_p = 40{,}000$ units and for the imperfect quality items is $\beta_i = 10{,}000$. The ordering cost is \$100 per cycle and the annual holding cost is \$5 per unit. The unit purchasing cost is \$25 and the unit screening cost is \$0.5. The selling prices are $S_p = \$50$ per unit of perfect quality and $S_i = \$20$ per unit of imperfect quality. The combined demand rate is $\beta = 40{,}000 + 10{,}000 = 50{,}000$ units per year and the ratio $\beta_p / \beta = 0.8 < p$. This implies that $t_p \geq t_i$. From (7), we have that the total annual profit function is $TPU(y) = 955556 - 44444444.44 / y - 2.36111\, y$. From (8), we have that the optimal order quantity is $y^* = 1372$ and the corresponding optimal annual profit is \$949,077. The behavior of the $TPU(y)$ function is illustrated in Fig. 5. The number of perfect and imperfect quality items are $qy^* = 1235$ and $(1-q)y^* = 137$, respectively. The length of the perfect quality items inventory cycle is $qy^*/\beta_p = 0.03087$ yr. = 11.27 days and that of imperfect quality is $(1-q)y^*/\beta_i = 0.01372$ yr. = 5.01 days. After 5 days, all imperfect quality items will be sold out and 686 units of perfect quality will be left to be sold over the remaining 6.27 days.

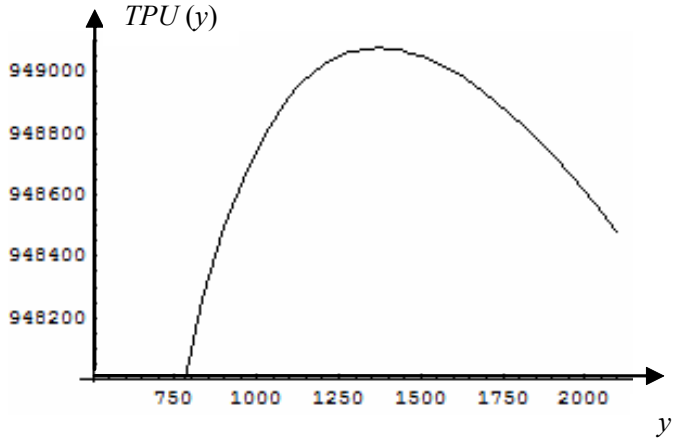

Fig. 5 : The total annual profit function $TPU(y)$

CONCLUSION

The model presented in this paper extends the classic economic order quantity (EOQ) model to the case where a percentage of the items received from a supplier are of imperfect quality. The imperfect quality items are assumed to be sold at a discounted price and the demands for both perfect and imperfect quality items are continuous during the inventory cycle. The inventory model

that accounts for the imperfect items was developed. The optimal order policy that maximizes the total profit per unit time was derived. Explicit expression for the optimal order quantity was obtained and the uniqueness of the optimal solution was demonstrated. A numerical example illustrating the model was given. For future work, we suggest incorporating the effects of time value of money and credit facility into this model. In other direction, we suggest considering the percentage of perfect quality items as a random variable and relaxing the assumption that the screening time is negligible.

REFRENCES

Cheng, C.E. (1991). An economic order quantity model with demand-dependant unit production cost and imperfect production processes. *IIE Transactions*, 23(1) 23-28.

Chiu, P. Y. (2003). Determining the optimal lot size for the finite production model with random defective rate, the rework process, and backlogging. *Engineering Optimization*, 35 (4), 427-437.

El-Kassar, A. N. & M. K. Salameh (2007). Optimal lot size for EPQ inventory model for items of different qualities. *Journal of Academy of Business and Economics*.8(4), 34-44.

Hayek, P. A. & M. K. Salameh, (2001). Production lot sizing with the reworking of imperfect quality items produced. *Production Planning and Control*, 12(6), 584-590.

Ozdemir, A. E. (2007). An economic order quantity model with defective items and shortages. *International Journal of Production Economics*. 106(2), 544-549.

Porteus, E.L. (1986). Optimal lot sizing, process quality improvement and setup cost reduction. Operations research, 34(1), 137-144.

Schwaller, R.L. (1988). EOQ under inspection costs. Production and Inventory Management, 29(3) 22-24.

Zhang, X. & Y. Gerchak (1990). Joint lot sizing and inspection policy in an EOQ model with random yield. IIE Transactions, 22(1), 41-47.

Salameh, M. K. & M. Y. Jaber (2000). Economic production quantity model for items with imperfect quality. *International Journal of Production Economics*, 64, 59–64.

RISKS AND SUCCESS FACTORS IN INFORMATION TECHNOLOGY (IT) OUTSOURCING

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ABSTRACT

This study focused on the risks involved in the Information Technology (IT) outsourcing projects. Risks pertaining to the information leakage and hidden costs, if not discovered and addressed at the appropriate time could result in serious damage to the intellectual property and the cost savings attributes of the outsourcing decisions. This research presents an examination of the metrics and the success factor models that provide guidance to the practitioners on measuring the outcome of the IT outsourcing projects.

INTRODUCTION

Outsourcing has emerged as an indispensable strategic tool of Information technology (IT) function in the IT industry as well as the non-IT industries in the second half of the 20th century. Gottschalk and Solli-Sæther (2005) defined outsourcing as the "practice of turning over all or part of an organization's IT function to an IT vendor". Firms that provide IT outsourcing services have grown into large corporations with multi-billion dollar revenues and outsourcing industry in the IT offshoring countries such as India is recording growth rates in excess of 30% for several years (Seddon, Cullen & Willcocks, 2007). The two primary reasons for this unprecedented growth rate are the focus on IT cost reduction and emphasis on the improvements in business performance (Fish & Seydel, 2006).

Researchers have often found the popularity of IT outsourcing is puzzling because the firms that engage in this activity for the reasons of cost reduction and improved performance do not always realize these benefits (Barthelemy, 2001). According to Barthelemy (2001), there are hidden costs in IT outsourcing that fall "somewhere between the point when managers first think of outsourcing and at the end of the effort when a company must either reintegrate the activities or switch to a new vendor". The author identifies four different hidden costs that could erode the potential cost benefits that are expected from the IT outsourcing (Figure 1).

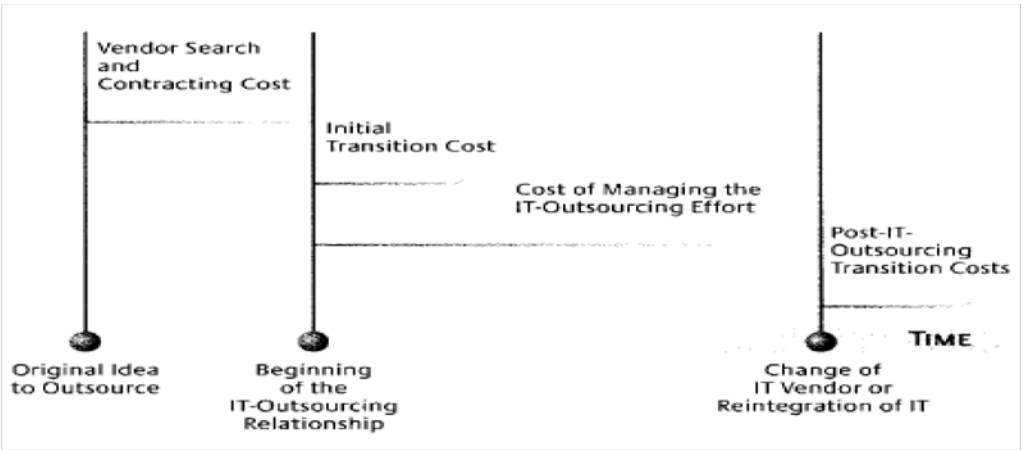

Figure 1: Hidden costs in IT outsourcing-- Adapted from Barthelemy (2001)

The first hidden cost identified by Barthelemy (2001) occurs during the stage of vendor search and contracting. Many enterprises that underestimate these costs incur significantly large expenses even before starting the outsourcing contract process. To minimize this hidden cost, the author recommends companies not to reduce their expenses for searching and contracting as this extra time spent in identifying the suitable vendor will greatly reduce any surprises in the future. Similarly, selecting trustworthy vendors and having the clarity of the outsourced project at the initial stages and spending enough time in creating the outsource contract that clearly reflects the project goals are critical to avoid the hidden costs at this stage.

Another hidden cost identified by Barthelemy (2001) is the cost of managing the outsourcing activity including the monitoring of the outsource contract, bargaining with the IT vendors and negotiating any changes in the contracts. The author stated that while the contract fee is clearly known to the client, the cost of managing the ongoing contractual relationship is not readily apparent. Because of the relative obscurity of these managing costs companies usually do not take them into consideration until the overall project costs eventually escalate. In the example cited by the author, the cost of managing the contract was as high as 17% of the overall project cost. Companies go through the process of incurring high managing costs until they accumulate enough experience in the IT outsourcing project management. During this learning process, establishing trust with the vendor is one recommended way to keep the management costs at the minimum level. Such trust in the relationship can be established by clear communication of the objectives, good communication and collaboration for problem solving, and frequent personal interactions.

Citing the past research, Hoecht and Trott (2006) also identified several levels of risks in the outsourcing of IT operations. Some of the important risks include dependence on the supplier, hidden costs, loss of competencies, inefficiencies of the vendor, social risks and poor management. Specifically, Hoecht and Trott (2006) examined the risks associated with "information leakage that arises when business organizations collaborate in order to gain access to knowledge and expertise that they cannot develop on their own". The authors argued that firms face higher risk as they shift from traditional outsourcing to strategic outsourcing.

From an organizational innovation standpoint, the ability of the service providers to leverage best practices among different clients is limited due to confidentiality agreements with the current and the previous clients. This issue is even more critical for firms employ the strategic outsourcing of short-term projects with multiple vendors. Hoecht and Trott (2006) captured this dilemma of information leakage and competitive advantages in Figure 2. To address the issue of confidentiality and information leakage, Hoecht and Trott (2006) recommended larger organizations to employ experts "that can make qualified judgments both on the trustworthiness and expertise of service provider consultants". Such strategy mitigates the risk of losing the "absorptive capacity and expertise" in the strategic outsourcing activities. The authors also cautioned managers that when the organizations move from traditional to strategic outsourcing higher risk of information leakage is likely to occur.

RISK MANAGEMENT IN IT OUTSOURCING

Researchers have proposed several methodologies to manage the risks in IT outsourcing. Kliem (2004) posited that "the benefits associated with the IT outsourcing will not be achievable unless the risks are managed throughout the lifecycle of these projects". The author provided the framework of risks associated with the outsourced projects and the process for developing the matrix of risks and controls to manage these risks according to the objectives of the outsourced project. Kliem (2004) also listed several challenges facing the offshore development projects. Some of these challenges are achieving goals and objectives, effectively applying resources, establishing and maintaining communications, finding collaborative solutions, building and maintaining trust, overcoming cultural differences etc.

Kliem (2004) classified the offshoring risks into the basic categories of financial, technical, managerial, behavioral and legal risks and provided the following definitions (Table 1).

Table 1: Types of Risks in IT offshoring

Type of offshoring risk	Description
Financial risk	Concerns with budget and cost
Technical risk	Concerns with tools, techniques and standards
Managerial risk	Concerns with decision making and reporting
Behavioral risk	Concerns with managing and leading people
Legal risk	Concerns with governmental laws and regulations

Mathew (2006) proposed a fuzzy risk assessment framework for the management of risk in IT outsourcing. The author posited that outsourcing the IT functions could result in the loss of control, flexibility, qualified personnel, and competitive advantage. These losses are compounded by the risks of incomplete understanding of future developments and bounded rationality of humans. According to the author, the fuzzy inference approach provides superior capability as it "embeds human expert knowledge expressed through natural language".

SUCCESS FACTORS IN IT OUTSOURCING

Factors that cause success have attracted considerable research in the IT outsourcing. Researchers have proposed several metrics to measure the outsourcing success and have propounded theoretical and empirical models to make predictions of the outcomes of the outsourcing decisions. The discussion below is an analysis of the performance metrics and prediction models in the IT outsourcing literature.

PERFORMANCE METRICS IN IT OUTSOURCING

Based on interview studies of 159 people that included clients, suppliers and advisers experienced in the IT field, Rottman and Lacity (2006) identified several best IT outsourcing practices. Creation of the balanced score card to monitor the success of the IT outsourcing activity is an important best practice identified by these authors. Among the various metrics employed by the program managers to measure the success of the IT outsourcing such as the costs, quality, timeliness and risk, the authors argued that appropriate weight must be given to the individual metrics based on the vision and the strategy of the client firm. Rottman and Lacity (2006) proposed a framework that measured the performance of the IT outsourcing based on the time duration and the size of the market (Figure 4).

According to Rottman and Lacity (2006), the "strategy and vision of an organization is important in determining not only which metrics it should track, but also the specific targets for those metrics". Such differentiation is critical because the relevance of the metrics is different for different companies. For clients, that use the retainer model for offshoring, utilization rates are an important metric. Comparative efficiency is another important metric for measuring the success in the IT organizations. This metric can be used to compare the relative performance of the offshore and the internal IT staff. For example, while the quantity of work done by the in-house staff could be greater than that produced by the offshore employees, the cost of running the offshore operation could be significantly lower. The authors also made the observation that office politics might play some role in the performance measurement. The study cited the example of an interviewee stating that this PMO manager received different estimates for the duration of completion for the same project work from the internal IT staff and the offshore supplier.

Gonzalez, Gasco and Llopis (2005) examined these success factors mainly from the standpoint of the client firms. The authors informed that the growth of outsourcing in the Western Europe has been very significant in the 1990s and that the scope and the range of the services being outsourced was also increasing with significant growth areas in the business process outsourcing, the application service providers, web and e-business outsourcing, and global outsourcing. Gonzalez, Gasco and Llopis (2005) conducted an extensive review of the IT outsourcing literature to identify the success factors in this activity.

SUMMARY

This study focused on the practical and the impending issues confronting the researchers and the practitioners such as the risks and the success factors involved in the IT outsourcing activity. We

have also analyzed the metrics and the success factor models that are relevant for the IT outsourcing activities. Future research area that is to be explored is the effect of outsourcing on different stakeholders. Such interest is expected in view of the potential job losses and their negative impact on the local communities.

REFERENCES

Barthelemy, J. (2001). The Hidden Costs of IT Outsourcing. MIT Sloan Management Review, 42(3), 60-69.

Fish, K.E. & Seydel, J. (2006). Where IT outsourcing is and where it is going: A study across functions and department sizes. *The Journal of Computer Information Systems, 46*(3), 96-103.

Gonzalez, R., Gasco, J. & Llopis, J. (2005). Information systems outsourcing success factors: a review and some results. Information Management & Computer Security, 13(5), 399-418.

Gottschalk, P. & Solli-Sæther, H. (2005). Critical success factors from IT outsourcing theories: An empirical study. *Industrial Management + Data Systems, 105* (5/6), 685-702.

Hoecht, A. & Trott, P. (2006). Outsourcing, information leakage and the risk of losing technology-based competencies. European Business Review, 18(5), 395-412.

Kliem, R. (2004). Managing the Risks of Offshore IT Development Projects. Information Systems Management, 21(3), 22-27.

Mathew, S.K. (2006). Understanding Risk in IT Outsourcing: A Fuzzy Framework. Journal of Information Technology Case and Application Research, 8(3), 27-39.

Rottman, J.W. & Lacity, M.C. (2006). Proven Practices for Effectively Offshoring IT Work. MIT Sloan Management Review, 47(3), 56-63.

Seddon, P.B., Cullen, S. & Willcocks, L.P. (2007). Does Domberger's theory of 'The Contracting Organization' explain why organizations outsource IT and the levels of satisfaction achieved? *European Journal of Information Systems, 16*, 237–253.

INVESTIGATING THE BUSINESS MANAGEMENT LEADERSHIP STYLES IN TECHNOLOGY SECTOR THAT CONTRIBUTE TO SOFTWARE PROJECT SUCCESS WITH REFERENCE TO OFFSHORE CENTERS IN INDIA

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ABSTRACT

The proper use of project management tools and the application of the mechanics of project management were once thought to be the major factors contributing to software project success. Current literature suggests that the management skills including leadership styles of software project managers are even greater contributors to software project success than are technical skills. The purpose of this research is to examine the Technical Leadership Styles contributing to software project success as perceived by a select group of project managers and project stakeholders. A survey instrument is used to collect information on and document the perceptions of selective project managers and Project stakeholders.

INTRODUCTION

The practice of project management has evolved over the past 30+ years and so have the roles and responsibilities of the project manager (Kerzner, 2006). During the period of traditional project management, project managers were selected from the technical ranks and expected to have significant technical expertise (Kerzner, 2006). Project success was measured by the technical merit of the project with little or no concern for the needs of the business or its customers (Kerzner, 2006). As project management evolved, however, there was an increased focus on the behavioral aspects of project management and the management skills of project managers (Kerzner, 2006; Kloppenborg & Opfer, 2002; Shenhar & Wideman, 2000). Modern project managers were expected to have basic technical skills and significant business expertise. Rather than performing the work, they built teams of subject matter experts that brought the skills needed to fulfill the project requirements (Kerzner, 2006).

Software project success has been a prevalent topic in industry publications and the subject of study by research analysts over the past several years. In 1994, the Standish Group issued its Chaos Report. The Standish Group surveyed 365 IT executive managers from companies in different industries and of different sizes to derive a quantitative analysis of project resolution by type. They also conducted a qualitative study using four focus groups. The purpose of the Standish report study was to understand the magnitude of software development project failures, the primary factors

causing software development failures, and what factors could increase the potential for project success (The Standish Group International, 1995).

PURPOSE OF THIS RESEARCH

The purpose of this proposed research was to examine the Technical Leadership Styles contributing to software project success as perceived by a select group of project managers and project stakeholders. Specifically, this research sought to achieve the following:

1. Investigate the Leadership Styles that contribute to software project success,

2. Interview selective project managers and document their perceptions, and

3. Document the conclusions and identify further research.

RESEARCH QUESTIONS

The research questions for this study were addressed by using a survey instrument to collect information on and document the perceptions of selective project managers and project stakeholders. Survey participants will be presented with statements that were designed to help the researcher answer these questions.

1. What Leadership Styles are perceived to contribute to software project success by project managers and project stakeholders?

   Hypothesis: There is no association between leadership style and the success/failure of software projects.

2. Which factor(s) is perceived to contribute most to software project success by project managers and project stakeholders?

3. What is the relationship between what is perceived to constitute software project success and project role?

   Hypothesis: There is no relationship between the perceived success of software projects and project role.

4. What is the relationship between what is perceived Leadership Style (as an ideal) to constitute software project success and organizational structure?

   Hypothesis: There is no relationship between perceived ideal leadership style to constitute a software project and organizational structure.

5. What is the relationship between what is perceived Leadership Style to constitute software project success and project management capability maturity (CMM)?

Hypothesis: There is no relationship between perceived ideal leadership style to constitute a software project and project management capability maturity (CMM)

HIGH LEVEL APPROACH AND RESEARCH DESIGN

A descriptive survey will be used to collect information on and document the data required for the study. A descriptive survey is most commonly used when the researcher wants to study a current day condition or phenomenon(Leedy & Ormrod, 2001). This is as opposed to a historical analysis that seeks to understand events or conditions of the past(Leedy & Ormrod, 2001). A descriptive survey may be an option for this study because the researcher sought to understand the current perceptions about factors that contribute to software project success from project managers and project stakeholders. Looking at current feelings and perceptions was important to the study because one of its intents was to compare the information collected here to past results published by the Standish Group. Knowing how project managers and project stakeholders once felt about contributing factors to projects success would be of no use in trying to determine if those perceptions have changed since the Standish Group report was published in 1994. Survey research can be conducted in a number of ways. One way is to interview participants directly. This can be done face-to-face or via telephone (Leedy & Ormrod, 2001). Another way to conduct survey research is through a self-administered Questionnaire (Leedy & Ormrod, 2001). This method involves sending a questionnaire to the survey participants, asking them to complete it, and return it to the researcher. Survey research has its strengths and weaknesses. One of it's strengths is that survey research is easy to design (Leedy & Ormrod, 2001).

A survey was chosen to collect data in this proposed study as a survey is often thought of as the best means to data collection for opinions and intentions. The **referral sampling** was chosen as a solid method of reaching an array and variety of users across genders, age groups, educational backgrounds, and varying degrees of intentions and opinions on Software Project Success in Offshore development centers in India. Because the focus of this proposed study is investigating software success, utilization of an eSurvey was chosen to be a great fit to reach and collect varying intentions.

In an attempt to answer the stated research questions, an in-depth review of the methodology for this proposed study follows. The methodology review will be an explanation of the reasons for the proposed design through a quantitative method and a review of the reasons for choosing the survey technique for data collection. After establishing the method and technique for this proposed study, the target population of this study, and the sampling of those users through electronic referrals will be explained. Next the sample size will be discussed and determined that at least 100 responses will need to be collected to conduct this study. The methodology review will further continue with reasons for conducting this survey electronically and example of the survey instrument will be included and explained. It will further be emphasized that participation in this study will be strictly voluntarily and anonymous.

Participants will be selected through referral sampling and their responses will be measured. Data analyses will be performed and findings will be analyzed for results and conclusions. The research design for this study will be quantitative. In this proposed study a survey instrument will be utilized to capture the opinions and perceptions of the employees of Software Development Centers in India . Because of the important role of the Internet in this study the survey instrument will be administered electronically or rather through an eSurvey.

SUMMARY

Management skills including leadership styles of software project managers are greater contributors to software project success than are technical skills. The purpose of this research is to examine the Technical Leadership Styles contributing to software project success as perceived by a select group of project managers and project stakeholders with special reference to offshore development centers in India. A survey instrument is used to collect information on and document the perceptions of selective project managers and Project stakeholders. This is a work in progress research.

REFERENCE LIST

Creswell, J., (2007). Qualitative Inquiry & Research Design: Choosing Among Five Approaches. Thousand Oaks, CA: Sage Publications

Davis, B. L., Skube, C. J., Hellervik, L. W., Gebelein, S. H., & Sheard, J. L. (1992). Successful Manager's Handbook: Development Suggestions for Today's Managers (Second ed.). Minneapolis, MN: Personnel Decisions, Inc.

Heckathorn, D. (2007). Extensions Of Respondent-Driven Sampling: Analyzing Continuous Variables And Controlling For Differential Recruitment. Sociological Methodology, 37, 151-XII. Retrieved October 6, 2008, from ProQuest Central database.

Kerzner, H. (2006). Applied Project Management: Best Practices on Implementation. New York, NY: John Wiley & Sons, Inc.

Kloppenborg, T. J., & Opfer, W. A. (2002). The Current State of Project Management Research: Trends, Interpretations, and Predictions. Project Management Journal, 33(2), 5-18.

Leedy, P. D., & Ormrod, J. E. (2001). Practical Research: Planning and Design (Seventh ed.). Upper Saddle River, NJ: Prentice-Hall, Inc.

Leedy, P. D., & Ormrod, J. E. (2005). Practical research planning and design. Upper Saddle River, NJ: Pearson Prentice Hall.

Shenhar, A. J., & Wideman, R. M. (2000) Optimizing Success by matching Management Style to Project Type [Web Page]. URL http://www.maxwideman.com/papers/success/intro.htm [2003, January 15].

Watson, S., Nwoha, O. J., Kennedy, G., Rea, K., (2005), Willingness to Pay for Information Programs about E-Commerce: Results from a Convenience Sample of Rural Louisiana Businesses. Journal of Agricultural and Applied Economics, 37(3), 673-683. Retrieved October 10, 2008, from ProQuest Central database.

Whitten, N. (2000). How Technical Must a Project Manager Be? Newton Square, PA: Project Management Institute, Inc.

Wideman, R. M. (2001) Project Management Simply Explained: A Logical Framework to Help Your Understanding [Web Page]. URL http://www.maxwideman.com/papers/framework/framework.pdf [2003, January 15].

DEVELOPING COLLABORATION SKILLS: A MIXED TEMPERAMENT APPROACH TO TEAMWORK

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ABSTRACT

Successful teamwork requires collaboration and the application of interpersonal and communication skills. Research shows that interpersonal and communications skills are highly desired for information systems graduates by employers. Research also shows that there is value in having students participate in teamwork projects while in school to develop more effective interpersonal and communications skills and understand collaborative processes. Organizing teams by mixing personality temperaments introduces an additional aspect of diversity providing a context where students are challenged to strengthen interpersonal and group dynamic skills. This paper presents an analysis of student experiences in using David Keirsey's temperaments assessment (available at no cost online at www.keirsey.com) as the basis for team membership assignments in both online and regular classroom settings. The feedback collected through student reflections on the personality temperament assessment experience reveals that this self-discovery process is an important step for students in developing better interpersonal and communication skills that they will need to be successful in their careers.

INFORMATION TECHNOLOGY DISASTER RECOVERY PLAN: CASE STUDY

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David Alijani, Southern University at New Orleans
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ABSTRACT

Computerized data has become critical to the survival of an enterprise. The number of organizations that rely on computerized systems to perform daily operations and assist in the decision making process has grown at a rapid pace recently and still continues to grow. Companies must have a strategy for recovering their data in the event of those fires, hurricanes or other natural disasters destroy their primary data center. Planning for recovery from a disaster is quickly becoming recognized as a necessity. In the aftermath of Hurricane Katrina in New Orleans and surrounding areas, many businesses were forced to implement an effective Information Technology (IT) Disaster Recovery plan (DRP) to help protect their business data for survival.

The paper describes the concepts of a disaster recovery plan and data replication; discusses the assessment, planning, implementation, and testing of the Disaster Recovery solution used by Houston Community College (HCC); and finally, examines the testing procedures of an actual extension of the plan in the face of real-life disaster. The HCC plan, which costs $166,930 annually, or about $1.92 per member of the HCC family, has proven to be one of the most effective and efficient Disaster Recovery plans implemented in the wake of Hurricane Katrina in August, 2005.

HOW UNCERTAINTY AVOIDANCE IMPACTS GROUPWARE APPROPRIATION

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ABSTRACT

Culture has been considered a factor affecting the reason behind the adoption of IT. Some issues and problems in the adoption of ITare mostly due to the lack of a fit between the technology and elements of the culture in the country of adoption. National culture has been shown to influence the adoption and use of IT and moderate the adoption effectiveness. This study explores the relationship between the Uncertainty Avoidance dimension in Hofstede's framework and the appropriation of technology by working groups. According to the results of the study, albeit the relationship is opposite to that hypothesized, there are significant statistical differences in both the Perceived Level of Comfort and Type of Appropriation in groups from both countries. Cultural differences do impact technology appropriation.

INTRODUCTION

Culture has been considered a factor affecting the reason behind the adoption of IT (Leung et al, 2005; Martinsons & Daviolson, 2003). Technologies are said to be culture-bound (Goulet, 1977), and their effects culture-determined (Fukuyama, 1995).

According to the literature in cross-cultural issues related to IT, there have been issues and problems in the adoption of IT that have not been fully explained (Powell, Piccoli, & Ives, 2004; Gopal & Prasad, 2000). These issues are mostly due to the lack of a fit between the technology and some elements of the culture prevalent in the country of adoption (Ronen & Shenkar, 1985). Such misfits ultimately lead to the failure of the adoption process, dissatisfaction, lack of commitment and poor performance (Soh & Sia, 2004; Newman & Nollen, 1996). As Hsiao (2007) asserts, the context of the environment wherein IT is adopted matters if the technology exchange is to be effective.

Albeit the field of research in cross-cultural issues related to IT is in its early stages, a number of studies have provided significant evidence to support the claim that the adoption of IT is moderated by cultural factors (e.g., Huang et al, 2003; Karahanna, Evaristo & Srite, 2002; Meyers & Tan, 2002). Cultural differences have been found to impact both the perceived usefulness and the perceived ease of use of IT (Parboteeah et al, 2005). Perceived usefulness and perceived ease of use moderate intention and, ultimately, the adoption of IT (Taylor & Todd, 1995; Davis, 1989). Differences in the level of uncertainty avoidance determine the rate and pace of innovation (McCoy, 2002). IT adoption is greater in highly individualistic, low power-distance societies (Bagchi et al, 2004). Power distance has an effect on the acceptance of email by users in different cultures (Huang et al, 2003).

Based on the results of a number of studies exploring the challenges faced by the cross-cultural adoption of IT, national culture (i) has an impact on perceptions, beliefs, behaviors (Leung et al, 2005; Sivakumar & Nakata, 2003) and adoption intention (Huang, Lu & Wong, 2003); (ii)

influences group processes and outcomes (Sivakumar & Nakata, 2003), and performance (Sivakumar & Nakata, 2003); (iii) influences the adoption and use of IT (Straub & Keil, 1997); and (iv) moderates the effectiveness of IT adoption (Bagchi, Hart & Peterson, 2004).

This study expands on the research of cross-cultural issues in the adoption of IT, by exploring the appropriation of groupware in two distinct cultures. Specifically, it focuses on studying the relationship between the Uncertainty Avoidance dimension in Hofstede's framework and a group's appropriation of the technology. In contrast with the study conducted by Bagchi et al (2004), which relied on secondary data, this study relies on working groups and their perceptions, attitudes and behaviors with the technology and, ultimately, with the intention to adopt it. The findings of their study indicated that IT adoption was greater in: (i) individualistic societies; (ii) societies with low power-distance scores; and, (iii) culturally-feminine societies. Their contention that IT adoption is lesser in nations with high uncertainty avoidance indexes was not supported. This study contends that differences in the level of Uncertainty Avoidance determine how the group appropriates the technology.

TECHNOLOGY APPROPRIATION

A considerable number of studies on the adoption of IT use a positivist lens and considers IT to be intrinsically beneficial. Regardless of any contextual or structural considerations, performance improvements are traced back to IT usage. This oversimplification falls short in explaining some IT adoption failures and misfits (Hsuao, 2007). In this study, a set of contextual factors, among them culture, is asserted to impact the way in which the group appropriates the technology. The Adaptive Structuration Theory (AST) criticizes the techno centric view of IT and emphasizes the social aspects (DeSanctis & Poole, 1994; Salisbury & Stollak, 1999). It also posits that there is a reciprocal and iterative relationship between technology and the context in which it is used (Chudoba, 1999). AST asserts that group technologies are not objects that are necessarily adopted in similar ways by all groups, but are appropriated by each group uniquely (Wagner et al, 1993). It also asserts that group outcomes are determined by a rather complex and continuous process, in which technology elements are appropriated by the users of the technology, in ways that produce and reproduce the structure of the system or social entity. Structures are both the medium and the outcome of group action (DeSanctis & Poole, 1994). According to AST, faithful appropriation of any IT positively impacts group performance.

AST emphasizes the importance of attitudes toward IT as determinants of group outcomes. Given that these attitudes are, in turn, affected by the prevalent national culture (Hofstede, 1980), the consideration of cultural factors becomes imperative in the study of IT adoption by working groups.

CULTURAL DIFFERENCES.

Hofstede defines culture "as a collective phenomenon, because it is at least partly shared with people who live or lived within the same social environment where it was learned." (1980). Hofstede also defines culture as a function of five dimensions or dichotomies: Power distance, uncertainty avoidance, individualism-collectivism, masculinity-femininity, and time horizon. Power distance

is a measure of the acceptance of the perception of inequality by members of a culture. Uncertainty avoidance is determined by the lack of tolerance for ambiguity and the need for formal rules. The Individualism/collectivism dichotomy deals with the extent to which a given individual put his interests ahead of his group's interests. Masculinity/femininity relates to the emphasis on work goals and assertiveness as opposed to personal and family goals. Finally, time horizon defines whether either a short-term or a longer-term orientation exists. In spite of several challenges to Hofstede's operationalization of culture, and therefore his results (e.g., Erez & Earley, 1993), this definition of cultural dimensions is satisfactory for the purposes of this study.

Hofstede's value-based model predicts individual and group attitudes and behaviors based on national culture (Pauleen, 2003). Such cultural differences are said to affect perceptions, beliefs and behaviors (Harrison & Huntington, 2000), team interaction (Chidambaram & Kaut, 1993), and group adoption and use of IT (Straub & Keil, 1997).

UNCERTAINTY AVOIDANCE AND TECHNOLOGY APPROPRIATION

The level of Uncertainty Avoidance (UA) is a function of the degree to which a social group feels threatened by ambiguous, uncertain, unknown situations (Ford et al, 2003). The higher the level of UA, the more social groups avoid taking risks (Hofstede, 1980). UA helps in explaining why societies adopt both strict codes of behavior and formal rules. (Tipurik et al, 2007). People in high UA societies rely on written rules and prefer stability (Parboteeah et al, 2005), exhibit low interpersonal trust, take known risks and resist change and innovation. On the other hand, when the level of UA is low, trust is widespread, people both rely on fewer written rules and welcome change and innovation (Bagchi et al, 2004). Individuals with high levels of UA are concerned with security in life and exhibit a need for consensus (Tipurik et al, 2007).

IT inherently involves change and uncertainty (Parboteeah et al, 2005). Societies with high scores on UA perceive change negatively, are not early adopters, and will unlikely perceive IT as useful to their work (Tipurik, 2007; Ford et al, 2003; McCoy, 2002).

When the structural features enabled by the technology are appropriated in ways specified by the goals the technology aims to promote, the appropriation is said to be faithful. As groups in high UA societies perceive IT as a source of uncertainty and, consequently, change, they will not appropriate the technology according to its spirit, that is, faithfully, assuming some level of appropriation occurs. In addition, if the groups somewhat appropriate the technology, there will be more changes in appropriation, as the groups will attempt to use IT in a way that conforms to their stability-seeking goal.

Hypothesis 1: Groups in societies with low UA indexes, working in an electronic environment, will feel more comfortable using IT than their counterparts in high UA-index societies.

Hypothesis 2: Groups in societies with low UA indexes, working in an electronic environment, will appropriate IT more faithfully than groups in high UA-index societies

RESEARCH METHODS

The study used a set of three questionnaires to collect perceptual data from groups solving a marketing case in an electronic meeting environment. A total of 176 subjects in 44 groups participated in the project. Group members were MBA students and, according to the data collected all had experience in both business and working in groups. They received extra credit for their participation in the study. The sample comprised 19 groups from a Colombian university, and 25 from two American 4-year colleges.

According to the UA indexes for both countries, which are 46 and 80 respectively (Hofstede, 2003), Colombia is defined as a country with high levels of UA. On the contrary, the U.S.A. is considered to be a low-UA society.

Groups were asked to solve the case following a structured, timed agenda that was based on Simon's rational model of decision-making. All the interactions and discussions took place in the electronic meeting space provided.

Both the case and the instruments were translated from English into Spanish, and checked by two public interpreters to insure complete equivalence between both versions. UA Index was the independent variable. The dependent variables were perceptual measures of Level of Comfort and Appropriation, collected in the post-study survey, using Likert-type scales. Higher values were associated with both a higher level of comfort and a faithful appropriation of the technology, respectively. The hypotheses were tested using single-factor ANOVA.

APPROPRIATION AND UA: RESULTS

According to the results of the study (see Table 1), there are significant statistical differences in both the Perceived Level of Comfort and Type of Appropriation in groups from both countries. However, the direction of the relationship is opposite to that hypothesized. Colombian groups reported a higher level of comfort with the system, and appropriated the groupware technology in a more faithful mode than their counterparts in the U.S.A. The differences are significant at the 0.05 level.

Table 1
Level of Comfort and Appropriation Perceptions
Mean Scores

Variable	Colombia	U.S.A.	F	p
Uncertainty Avoidance Index	46	80		
Level of Comfort	3.90	3.09	20.77	<.0001
Appropriation	3.87	3.34	28.91	<.0001

A possible explanation for the direction of the relationship could be found in an analysis of the differences in other cultural dimensions and their impact on technology appropriation. It may be that some of the dimensions in Hofstede's model have a greater impact on the perceptions and

behaviors of working groups and, consequently, on the appropriation they make of technologies. It could also be that the impact of UA on IT adoption varies by type of technology.

A strong presence of social cues in group interaction could be a predictor of dominance by a few members and conformance by the rest of the group (Mejias et al, 1997). In cultures with high Power Distance indexes (e.g., Colombia), the communication channels available in groupware suppress some of the social cues that are present in face-to-face interactions. As dominance is lessened when groupware is incorporated into the process of working groups, members tend to participate more openly and frequently, make more contributions, and analyze them more frankly and in more depth (Perez-Alvarez, 2005). These groups tend to consider the electronic environment propitiates a more effective handling of the group tasks and, consequently, express higher levels of satisfaction with both the process and the outcome and are, ultimately, more prone to adopt the technology (Perez-Alvarez, 2008). Although they may resist change, groups could consider that the risks are offset by the improvements the technology brings to the process and outcomes.

Group technology focuses groups' efforts on the task-dimension, removes the emphasis on the individual well-being of groups' members, and promotes the generation of solutions that support the general welfare of the group (Morales et al, 1995). Caring for groups' welfare is a value that characterizes collectivistic societies (e.g., Colombia). In addition, group technology has been found to promotes a more egalitarian distribution of participation, which in turn makes groups become more cohesive (Dailey, 1980). Collectivistic societies regard cohesiveness very highly. Although Colombian groups may exhibit some disposition to resist change, they could be more willing to adopt groupware as this technology promotes the group's welfare and boosts cohesiveness.

Groups in Colombia, a collectivistic society, reported higher levels of satisfaction with both the process and the outcome, and higher levels of agreement than what their American counterparts did. (Perez-Alvarez, 2008a). Positive perceptions about the ability of the technology to support goal attainment, as well as higher levels of comfort and satisfaction with the technology, are associated with faithful appropriations of the technology (Perez-Alvarez, 2008a).

In summary, albeit UA may have negatively impacted the ways in which groups adopted and used the technology in Colombia, it seems that other cultural dimensions prevalent in that society (e.g., large Power Distance, Collectivism) played a stronger role in positively shaping the perceptions and behaviors of groups toward the group technology. UA is not the sole predictor of technology adoption and use.

CONCLUSIONS

National culture has an impact on perceptions, beliefs, behaviors (Leung et al, 2005; Sivakumar & Nakata, 2003) and IT adoption intention (Huang, Lu & Wong, 2003). In fact, as groups from culturally distinct societies use groupware, their perceptions, level of satisfaction, and mode of appropriation differ. Such differences are a function of the differential found in some cultural dimensions such as Power Distance and Collectivism. Although Uncertainty Avoidance also affects perceptions and adoption of IT, its impact is moderated by other cultural dimensions. Such differences also influence how IT is adopted and used (Straub & Keil, 1997), moderate the effectiveness of IT adoption (Bagchi, Hart & Peterson, 2004). Furthermore, they also affect group

processes and outcomes (Sivakumar & Nakata, 2003) and, ultimately, performance (Sivakumar & Nakata, 2003).

In conclusion, the effective adoption of group technologies requires a fit between the features of the technology and the cultural aspects of the environment in which they will be used. One could ask whether the impact of cultural differences on IT adoption varies by type of technology. If it does, the question would specifically ask for the type of fit needed for each type of technology.

REFERENCES

Bagchi, K., Hart, P., & Peterson. M.F. (2004). *National Culture and Information Technology Product Adoption.* Journal of Global Information technology management, 7(4): 29-46

Chidambaram, L., & Kautz, J.A. (1993). *Defining common ground: managing diversity through electronic meeting systems*. Proceedings of the Fourteenth International Conference on Information Systems, 1-11

Chudoba, K.M. (1999). *Appropriations and Patterns in the Use of Group Support Systems.* The Data Base for Advances in Information Systems, 30(3-4): 13-148

Dailey, R.C. (1980). *A path analysis of R&D team coordination and performance*. Decision Sciences, 11(2):357-369.

Davis, F.D. (1989). *Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology.* MIS Quarterly, 13(3): 319-340

DeSanctis, G. & Poole, M.S. (1994). *Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory.* Organization Science, 5(2): 12-147

Erez, M., & Earley, P.C. (1993). *Culture, Self-Identity and Work*. New York: Oxford University Press.

Ford, D.P., Connelly, C.E. & Meister, D.B. (2003). *Information Systems Research and Hofstede's Cultures Consequences: An Uneasy and Incomplete Partnership.* IEEE Transactions on Engineering management, 50(1): 8-24

Fukuyama, F. (1995). *Trust: The Social Virtues and the Creation of Prosperity*. London: Hamish Hamilton.

Gopal, A., & Prasad, P. (2000). *Understanding GDSS in symbolic context: Shifting the focus from technology to interaction. MIS Quarterl*y, 24(3): 509-546.

Goulet, D. (1977). *The uncertain promise: value conflicts in technology transfer*. New York: IDOC/North America.

Harrison, L.E. & Huntington, S.P. (2000). *Culture Matters: How Values Shaped Human Progress*. New York: Basic Books.

Hofstede, G. (1980). Culture's Consequences: International Differences in Work-Related Values. Beverly Hills: Sage Publications.

Hofstede, G. (2003). *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations*. Beverly Hills: Sage Publications.

Hsiao, R.L. (2007). *Misaligned Market: The Importance of Industry Context in Technology-Mediated Exchanges.* Journal of Global Information Management, 15(3): 69-87

Huang, L., Lu, M.T. & Wong, B.K. (2003). *The Impact of Power Distance on Email Acceptance: Evidence from the PRC.* The Journal of Computer Information Systems, 44(1): 93-101

Karahanna, E., Evaristo, J.R., & Srire, M. (2002). *Methodological Issues in MIS Cross-Cultural Research*. Journal of Global Information Management, 10(1): 48-55.

Leung, K, Bhagat, R.S., Nuchan, N.R., Erez, M. & Gibson, C.B. (2005). *Culture and International Business: Recent Advances and Their Implicationsfor Future Research*. Journal of International Business Studies, 36: 357-378

Martisons, M., & Davidson, R. (2003) *Cultural Issues and IT Management.* IEEE Transactions on Engineering management, 50(1): 113-117

McCoy, S. (2002). *The Effect of National Culture Dimensions on the Acceptance of Information technology: A Trait-Based Approach.* Doctoral Dissertation, Pittsburg: University of Pittsburgh.

Mejias, R.J., Sheperd, M.M, Vogel, D.R., & Lazaneo, L. (1997). *Consensus and Perceived Satisfaction Levels: A Cross-Cultural Comparison of GSS and Non-GSS Outcomes Within and Between The United States and Mexico*. Journal of Management Information Systems, 13(3): 137-161.

Meyers, M. D., & Tan, F. (2002). *Beyond models of national culture in information systems research*. Journal of Global Information Management, 10(1), 2433.

Morales, B., Moreira, H., & Vogel, D. (1995). *Group Support for Regional Development in Mexico*. Proceedings of the 28th. Hawaii International Conference on System Sciences (HICSS)

Newman KL and Nollen SD (1996) *Culture and congruence: the fit between management practices and national culture*. Journal of International Business Studies 27(4):753–779

Parboteeah, D.V. & Parboteeah, K.P. (2005). *Perceived Usefulness of Information Technology: A Cross-National Model.* Journal of Global Information technology management, 8(4): 29-48

Pauleen, D.J. (2003). *Lessons learned crossing boundaries in an ICT-supported distributed team*. Journal of Global Information Management. 11(4): 1-19.

Perez-Alvarez, C. (2008). *Cultural Dimensions and Group Perceptions in Electronic Environments*. Proceedings of the The 12th. World multi-Conference on Systemics, Cybernetics, and Informatics, I:. 198-203

Perez-Alvarez, C. (2008a). *Does Power Distance Affect Perceptions about Equality of Participation in Distributed Groups?*. Proceedings of the International Academy of Business and Public Administration Disciplines (IABPAD) Conference, 5(2): 1041-1048

Perez-Alvarez, C. (2005). *Do Task and Technology Perceptions Affect the Outcomes and the Appropriation of Technology by Working Groups*?, International Journal of Knowledge, Culture and Change Management, 5: 71-78

Powell,A., Piccoli, B., & Ives, B. (2004). *Virtual Teams: A Review of Current Literature and Directions for Future Research*. Database, 35(1): 6-36.

Ronen, S. & Shenkar, O. (1985). *Clustering countries on attitudinal dimensions: A review and synthesis*. Academy of Management Review, 10: 435-454.

Salisbury, W. D. & Stollak, M.J. (1999). *Process-Restricted AST: An Assessment of Group Support Systems' Appropriation and Meeting Outcomes Using Participants Perceptions.* Proceedings of the 20th. International Conference on Information Systems: 29-39

Sivakumar, K., & Nakata, C. (2003). *Designing Global New Product Teams. Optimizing the Effects of National Culture on New Product Development*. International Marketing Review, 20(4): 397-445.

Soh, C. & Sia, S. (2004). *An Institutional Perspective on Sources of ERP Package-Organization Misalignments.* Journal of Strategic information Systems, 13(4): 375-397

Straub, D., Keil, M. & Brenner, W. (1997). *Testing the technology Acceptance Model Across Cultures: A Three Country Study.* Information & Management, 33(1): 1-11

Taylor, S. & Todd, P.A. (1995). *Understanding Information Technology Usage: A Test of Competing Models.* Information Systems Research, 6(2): 144-176

Tipurik, D., Podrug, N. & Hruska, D. (2007). *Cultural Differences: Results from Empirical Research Conducted in Croatia, Slovenia, Bosnia and Herzegovina and Hungary*. The Business Review, Cambridge, 7(1): 151-157.

Wagner, G.R., Wynne, B.E., & Mennecke, B.E. (1993). *Group Support Systems: Facilities and Software*. In:L.M. Jessup, & J.S. Valacich (Eds), Group Support Systems: New Perspectives. NY: McMillan Publishing Co.: 8-55

THE ANNUAL PERFORMANCE EVALUATION PROCESS NEEDS TO BE ELIMINATED

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ABSTRACT

The annual performance evaluation process has long been the cornerstone of performance management where managers use the process in order to evaluate work and provide feedback to employees. This paper contends that the current annual performance evaluation is riddled with problems that can destroy morale, impede teamwork, and lead to organizational ineffectiveness. Political and personal issues cloud the process; those who are seemingly "liked better" by their managers have the edge and garner more favorable evaluations. Additionally, if managers wait to use an annual performance evaluation process in terms of talking to employees about how they have been doing during the past year, there are undoubtedly surprises that can surface. One other factor to consider in continuing the performance evaluation process as we know it is that many Baby Boomers are retiring from the workplace and Generation Y employees are filling those vacancies. Gen Y employees can become easily bored and are more apt to leave the job if they are not managed properly; they may need more frequent feedback than an annual evaluation. This paper proposes that the current annual performance evaluation process is not working. Managers need to find a more direct way of working with employees in a team-like relationship and to better begin to develop a trusting manager-employee relationship.

A NEURAL NETWORK BASED CLASSIFICATION AND DIAGNOSIS OF BRAIN HEMORRHAGES

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ABSTRACT

Despite advances in medical sciences, many patients cannot gain benefits from developed methods, especially health care specialists in areas such as, in our case, brain diagnosis. Lack of proper system detection is increasing the death rates in the patients. Brain hemorrhage is one of the most frequent forms of hemorrhages among the people all over the world. Previous systems has tackled the problem of detection of brain hemorrhage through Magnetic Resonance Imaging (MRI) images. The social problem this research addressed is the lack of system for detection and classification of brain haemorrhages. This research explores the application of artificial neural networks (ANN) in medical diagnosis and classification computerized algorithms for diagnosing brain hemorrhage by examining Computer Tomography (CT) images of patients. After employing a neural network based Methodology; the results indicate that the system uses a classification approach and has an accuracy of 73% detection when evaluated against a specialist recommended medical referral decision. The input dataset to the trained Artificial Neural Network obtained from CT scanned images. The results of this study could potentially useful to develop further detection systems for medical community in terms of predicting patients who are likely to have brain hemorrhages.

INTRODUCTION

Brain Hemorrhage (BH) is one of the most complex conditions among the people all over the world. Previous systems have tackled the problem of detection of brain hemorrhage through MRI images. BH is a condition caused due to a sudden stroke to a person after blood leaks out from the blood vessels in the brain; this causes the patient to become seriously ill and needs immediate treatment. For these reasons, medical and computer scientists around the world are trying to find a solution to develop systems to automate diagnosis for BH.

The work reported in this paper is focusing on developing a Hemorrhage detecting algorithm on Brain CT images. The application is detecting, or labeling, of each pixel of a 2D brain CT image to one of the main tissue classes: grey matter (GM), white matter (WM), and background. The work presented in this paper attempts to automate the diagnostic process using various artificial intelligence (AI) techniques for early detection of BH. Here, we focus on developing new methodology for detection of Hemorrhage using computer tomography (CT) images, whose image is very large. The goal of this paper is to develop a simulated system to identify early detection of BH, so that Potential problems can be addressed as early as possible.

This research explores the application of artificial neural networks in medical diagnosis and classification algorithms for Diagnosing BH by examining CT images of patients. After employing

a neural network based methodology; the results indicate that the best System uses a classification approach and has an accuracy of 73% when evaluated against a specialist recommended referral decision. The proposed approach has the advantage requiring train the neural network for different dataset yields good results. The objective in developing a neural network classifier is to minimize total misclassification errors or to maximize the over all correct classification rate. The results show that both asymmetric misclassification costs and have significant effects on the classification performance of ANN.

PROBLEM STATEMENT

In medical diagnosis, addressing BH detection and classification into different types is complex problem. Lack of systems for detection and classification of BHs has increased death rates. These high death rates often stall patients. Research studies, in last decade indicate that many classification problems are efficiently solved with the help of Artificial Neural Network (ANN) ([1], [2], [3], [4], [5], [6], [7], [8], [9]). A possible solution to this social problem is to utilize detection and classification techniques such as Sparse Component Analysis (SCA), artificial neural networks (ANN) to develop a method for detection and classification of BH. ANN's classification problems in medical diagnosis such as BH can be solved in an efficient way. SCA is used to extract the essential features for detection of hemorrhage.

BH situation occurs due to the break in the wall of blood vessel, the blood spills out of the blood vessel and enters the area where vital tissues and cells of brain reside, killing those tissues and cells; this causes the patient to become seriously ill and needs immediate medication/treatment. BH grading is crucial step for determining treatment planning and patient management .Medical Image analysis and processing has great significance in the field of medicine, especially in non-invasive treatment and clinical study. Medical imaging techniques and analysis tools enable the Doctors and Radiologists to arrive at a specific diagnosis. Clinicians classify hemorrhages into two types. They are External and internal. Further they are classified into 5 types.

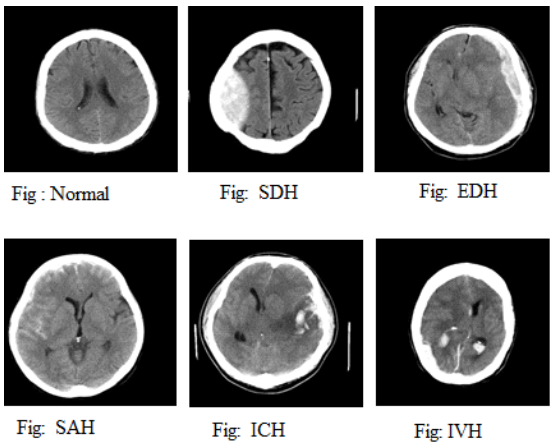

Fig 1. Types of BHs

PURPOSE OF THE RESEARCH

The primary purpose of this paper is to detect BHs and classify them and provide the patient with correct diagnosis. As the reviewing procedure has been proven to be a highly subjective task depending both on the experience and skill of expert, diagnostic errors are considered as common in daily clinical practice. However these errors may provoke false treatment planning with adverse effects in patient survival and need to be prevented. By being able to identify hemorrhage at early stages diagnosed and treated, the better a person's chance for a full recovery as some common hemorrhages are easier to treat and cure if they are found early.

In order to accomplish this purpose, we use a two-part strategy. First, we applied a technique known as sparse component analysis to separate the water and fat content. Second, specific operations are performed on the water image leaving the fat image. Some operations are performed and hemorrhage part is detected and classified. By accurately determining the features such as water content, fat content, location, volume etc. Artificial neural network is trained to classify the BH. These trained interventions lead to better patient success rates in medical diagnosis. Also, the approaches taken by this paper were considered to be a foundation for a framework that results in effective detection is not only brain but also other parts in the body but such as lung, liver.

METHODOLOGY

The proposed methodology comprises of following steps. Patients CT image is taken as the input.

Step 1. Remove skull from the image:
The CT image consists of regions like skull, gray matter, white matter, abnormal region like blood clots, hemorrhages etc. therefore our first step is to remove Skull region from encephalic region. In CT images, the skull is the brightest elliptical part .We fit an ellipse to the pixel with intensity above 250. Thus the encephalic region is the region inside this ellipse and has intensity less than 250.

Step 2. Apply sparse component analysis on the image:
The sparse component analysis will separates the input CT image into fat and water images. We consider only fat image as the hemorrhages are detected in the fat image. Therefore all the remaining operations are performed on the fat image only.

Step 3. Remove grey mater from encephalic region:
The second step is to remove the gray matter. Most parts of the content inside the skull are the gray matter. To get the hemorrhages, a simple subtraction off the gray matter intensity will give us an image with the background removed and the hemorrhages left. If the pixel intensity lies between 130 and 180, then it is considered as the pixel which is present in grey matter. We group all the pixels which are present in that range.

Step 4. Apply masking and filtering techniques to remove noise:
Apply image processing techniques such as masking and filtering on the resultant fat image. Filtering removes noise from the image and masking removes rough edges. Therefore image with smooth edges is left out. The resulting image is the image which is left with the hemorrhage part only.

Step 5. Calculate the volume of the hemorrhage and perform segmentation on the image:

Volume of the hemorrhage is calculated. The total number of nonzero pixels gives the volume of hemorrhage. Each pixel in the image is scanned for this purpose. The image from the previous step is segmented in to 4 parts. This is done for finding the location of the hemorrhage .calculate the volume of fat and water in each segment.

Step 6. The next step is classification using neural networks:

Classification is done based on the features such as water content, fat content, volume, and location of hemorrhage.

EXPERIMENTAL RESULTS

After removing skull and grey matter

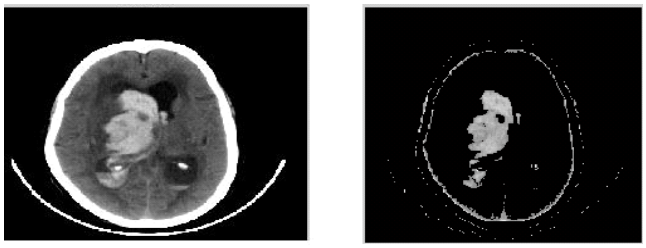

Fig 3. Left Image; Right: Skull Removed

After application of filtering and masking techniques on Skull removed image.

Fig 4. Hemorrhage Region

After application of Sparse Component Analysis

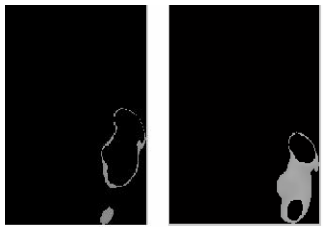

Fig 5. After Image

Next step is finding the location of hemorrhage. This is achieved through performing segmentation on hemorrhage image.

seg1 seg2 seg3 seg4

Fig 6.

Water, fat, location of hemorrhage is applied as inputs to trained neural network. Here we plot the performance graph of neural network before training.

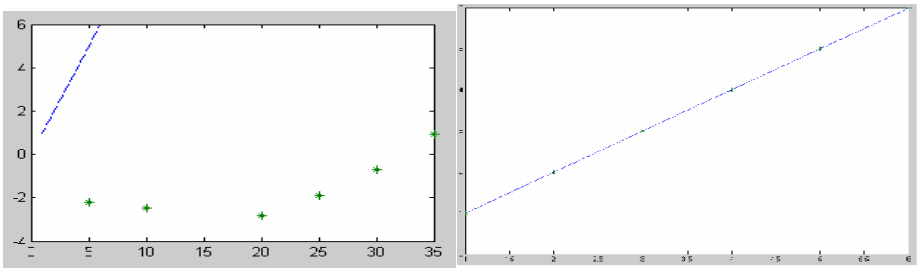

Fig 7. Performance graph before training and Fig 8. Performance of Neural Network after training with TRAINLM

SUMMARY

We have developed a system for detection and classification of brain haemorrhages using the application of artificial neural networks (ANN) and computerized algorithms. Results are validated by physician. The results indicate that the system has an accuracy of 73% when evaluated against a specialist recommended referral decision.

REFERENCES

[1] Hemorrhage Slices Detection in Brain CT Images by Ruizhe Liu, Chew Lim Tan, Tze Yun Leong, Cheng Kiang Lee, Boon Chuan Pang, C. C. Tchoyoson Lim, Qi Tian, Suisheng Tang, Zhuo Zhang , 978-1-4244-2175-6/08©2008 IEEE

[2] T.Hara, N.Matoba, X.Zhou, S.Yokoi, H.Aizawa, H.Fujita, K.Sakashita and T.Matsuoka, Automated Detection of Extradural and Subdural Hematoma for Content-enhanced CT Images in Emergency Medical Care, Proceeding of SPIE, 2007.

[3] T.Chan, Computer aided detection of small acute intracranial hemorrhage on computer tomography of brain, Computerized Medical Imaging and Graphics 07(4-5): 285-298, June-July, 2007.

[4] C. T. Tsai, Y. N. Sun, P. C. Chung, and J. S. Lee, "Endocardial boundary detection using a neural network," Pattern Recog., vol. 26, pp. 1057-1068, 1993.

[5] K. S. Cheng, J. S. Lin, and C. W. Mao, "The application of competitive Hopfield neural network to medical image segmentation," IEEE Trans. Med. Imaging, vol. 15, no. 4, pp. 560-567, 1996.

[6] M. Zibulevsky and B. A. Pearlmutter, "Blind source separation by sparse decomposition," Neural Computation, vol. 13, no. 4, 2001.

[7] D. Pham and P. Garrat, "Blind separation of a mixture of independent sources through a quasi-maximum likelihood approach," IEEE Trans. Sig. Proc., vol. 45, pp. 1712–1725, 1997.

[8] G. Cohen, et al., "Segmentation Techniques forthe Classification of Brain Tissue Using Magnetic Resonance Imaging," Psychiatry Research- Neurocomputing, vol. 45, May 1992, pp. 33-56.

[9] M. Zibulevsky, "Sparse source separation with relative Newton Method," in Proc. ICA2003, April 2003, pp. 897–902.

COGNITIVE SUPPORT FOR SENIOR MANAGERS' DECISION MAKING IN INFORMATION SYSTEMS SECURITY

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ABSTRACT

Previous research reveals a number of reasons why senior management does not take an active role in decision making concerning information systems security. A major reason is the technical nature of the subject and the difficulties in communicating with security personnel. A methodology is proposed to deal with this problem. Graphical tools are employed to portray the important characteristics of information systems security without the use of technical jargon. Using these tools, senior managers and information systems security personnel more effectively communicate.

INTRODUCTION

Security failures have long been a serious threat to information systems (Straub and Welke, 1998; McClure, 2001). The GAO Report 07-705 in 2007 quoted an FBI survey that indicated that the estimated total loss to computer crime in 2005 was 67.2 billion dollars. Regardless of the dollar estimates of the damage, the threat from computer and information crime continues unabated; therefore, senior managers need to become more informed and active in the prevention of security breaches (Loch, Carr, and Warkentin, 1992). Executives have often considered information security important but not critical (Straub and Welke 1998; Carey, 2006). Information system security, by its nature, is very technical and thus can be difficult to understand and manage. The purpose of this manuscript is to propose a methodology to allow IT personnel to communicate security system design alternatives to senior managers while suppressing most of the technical details. Likewise, senior management can use the methodology to communicate its requirements to IT personnel.

RESPONSIBILITY FOR INFORMATION SYSTEMS SECURITY

Ultimate responsibility for all decisions regarding internal control, including IS security, rests with senior management (Geary, 1993). Posthumus and von Solms (2004) recognized that information security should be a priority of executive management. This is now reflected in the Sarbanes-Oxley Act of 2002. Under the Act, the chief executive officer and chief financial officer of each publicly-traded company must certify in annual submissions to the Securities and Exchange Commission that internal controls are in place and functioning. (U.S. 107th Congress, 2002).

THE CHASM BETWEEN SENIOR MANAGEMENT AND IS SECURITY PERSONNEL

In order to make informed decisions, senior management personnel need information and options presented in a manner that will allow them to understand the salient issues and ask the proper questions. Research indicates that the lack of senior management involvement in IS security can be attributed to the differences in language and culture between information security personnel and senior managers (McFadzean et al., 2003). It has long been recognized that the technical language of the security function forms a barrier to effective communication between managers and security personnel (Ezingeard et al., 2005). In addition, Belsis and Kokolakis (2005) observed that most stakeholders lack the required knowledge of IS security issues that would allow them to play an important role in IS security management

The authors propose that graphical models be employed to illustrate the various components of IS security. This allows the relationships among the components to be presented with a minimum use of overly technical jargon. A visual depiction of the various relationships among the decision variables can provide the decision maker with cognitive support in the decision-making process (Troy and Moller, 2004). Watson and Driver (1983) and Card et al. (1999) identified a number of ways that visualization can support cognition

THE SECURITY/PRODUCTIVITY TRADEOFF

Given that security is a cost to the business or requires additional investment in assets, the question arises as to the benefits to be gained from investments in information systems security. The reasons can be approached from a number of perspectives.

As there are always costs associated with security, the reduction in expected losses from an effective security system should exceed the costs, resulting in a net gain for the organization.

Privacy is another reason for implementing a security system. Privacy cannot be achieved without security. If privacy is a business imperative, then security must be in place to support the privacy requirement

The relationship between security and productivity can be considered one of competition. The absence of security or its implementation at a low level may initially have no effect or even a brief positive affect on productivity. If, at some point a significant security breach occurs, losses in productivity will result from a lack of resources, loss of reputation and trust, loss of trade secrets, and legal liability for failure to exercise due care and diligence. These losses can easily exceed the direct costs of the security measures and any productivity losses due to the implementation of higher levels of security.

In contrast, a security system which is too strict can impede the productivity of the organization. There can be significant productivity losses due to the inability of employees to access equipment and data needed to perform their jobs or coordinate their activities. In determining the appropriate level of security, senior management will receive recommendations and advice from security personnel and users. Inevitably, the recommendations from these two groups will be contradictory.

Security personnel will tend to advocate the maintenance of IS security at the higher end of the scale. On the other hand, users will tend to reject any security measures that can result in a

genuine, near-term loss of productivity when the security measure promises a benefit which is often difficult to quantify or even define in terms of when it will be received. Understanding this balance is critical for senior managers since they will have to be the arbitrators between the competing interests (Helsing et al., 1989).

RISK MANAGEMENT

When determining which information technology (IT) features will be implemented, the balance between security and productivity must be evaluated. Risk, the probability of an adverse event occurring, results from the interaction of threats facing the organization and vulnerabilities within the organization. In general, threats exist outside the organization's control so there is very little that can be directly done about them. Vulnerabilities result from the choices of what technologies to employ or where to locate assets. Most vulnerabilities result from the internal decisions of the organization and trade-offs can be managed. However there are a number of threats that are within the control of management.

Risk, as previously stated, is a function of the interaction of threats and vulnerabilities. Once a risk has been identified, management has a number of options available to deal with the issue. These options fall into two broad categories. The first is to make the attack more difficult through the application of controls, thus lowering the probability it will occur or be successful, or to mitigate its impact on the organization. The second is to transfer the economic consequences of the attack to another entity through insurance.

After the controls have been implemented and/or the risk of loss has been transferred to another party through insurance, there is usually a portion of the risk remaining. This remaining portion is referred to as residual risk. Ross and Weill (2002) identify six categories of information systems (IS) decisions which senior management should not delegate to IS personnel. One of these categories is decisions concerning which security and privacy risks should be accepted by the organization.

The Extended Risk Analysis Model (Reid and Floyd, 2001) show these relationships in a graphical format. In this model, after the risk has been identified, controls and insurance are applied in an iterative manner until management is comfortable with the level of residual risk. The entire process is repeated for each different risk that has been identified. After the risks have been identified, senior management should be presented with a number of control options that will help to manage the risks. A popular model for the evaluation of security systems is known as the CIA (Confidentiality, Integrity, and Availability) model Whitman (2003). The relationships among these three characteristics of a security system can best be visualized by placing each one at the corner of a triangle (Reid, Wei and Platt, 2005). Management can select any place within the boundaries of the triangle to provide a mix of confidentiality, integrity, and availability that is most appropriate to the risk that is being mitigated. The triangular format is also very valuable in that it allows the executive to visualize the relative trade-offs that are being made among the three characteristics. The executive should be focusing on the desired functionality of the system, not the technical details. By using this model, the executive can express his or her desires for system security without getting immersed in the technology of the various security alternatives. Once the executive has determined

the desired levels of each characteristic by identifying a location within the triangle, security personnel can identify the appropriate technological solution.

CONCLUSIONS

Securing an organization's information assets is an imperative in today's business environment. The threats directed against these assets are largely outside of the control of management. However, management does have control over such things as location, technologies used, and functionalities that are implemented within the information system. The interaction of the vulnerabilities associated with location, technology and functionalities and the threats produces risk. This risk can be managed through the use of controls and/or the transfer of the economic impact through the use of insurance.

Unfortunately, there is an inverse relationship between security and productivity. One of the key roles of management is to determine the desired balance between the application of security and the losses in productivity. The use of graphical models to display the relationships between the components of a security system. This presentation mode allows managers to concentrate on security requirements and security personnel to concentrate on technical issues.

Future research should be focused on the design of methodologies which will allow collection of empirical data on the concepts addressed in this manuscript and analysis of the relationships among those concepts. In addition, the performance impact of various security system designs should be analyzed to determine the impact on organizational productivity.

REFERENCES

Belsis, P. and S. Kokolakis, (2005). "Information Systems Security from a Knowledge Management Perspective," *Information Management and Computer Security*, 13(3):189-202.

Card, S. K., J.D. Mackinlay and B. Shneiderman, (1999). *Readings in Information Visualization: Using Vision to Think*. San Francisco: Morgan Kaufmann Publishers.

Carey, A., (October 2006). *,2006 Global Information Security Workforce Study,* available athttps://www.isc2.org/download/workforcestudy06.pdf.

Ezingeard,, J., E. McFadzean and D. Birchall, (2005). "A Model of Information Assurance Benefits," *Information Systems Management*, 22(2): 20-29.

Geary, J. M., (1993). "Executive Liability for Computer Crime and How to Prevent It," *Information Management & Computer Security*, 2(2): 29-31.

GAO Report 07-705, (June 2007). *CYBERCRIME Public and Private Entities Face Challenges in Addressing Cyber Threats.*

Helsing, C.. M. Swanson and M. A. Todd, (1989). "Management Guide to Protection of Information Resources," *NIST Special Publication 500-170.*

Loch, K. D., H. H. Carr and M. E. Warkentin, (1992). "Threats to Information Systems: Today's Reality, Yesterday's Understanding,*" MIS Quarterly*, 16(2): 173-186.

McFadzean, E., J. N. Ezingeard, and D. Birchall, (2003). "Boards of Directors Engagement with Information Security," Henley Working Paper (HWP0309) (available from www.henleymc.ac.uk).

Posthumus, S., and R. von Solms, (2004). "A Famework of the Governance of Information Security," *Computer & Security*, 23(8): 638-646.

Reid, R. C. and S. Floyd,(2001). "Extending the Risk Analysis Model to Include Market Insurance", *Computers and Security*, 20(4): 331-339.

Reid, R. C., J. Wei, and R. G. Platt,., (September, 2005). "A Teaching Module to Introduce Encryption for Web Users," *2005 Information Security Curriculum Development Conference (InfoSecCD* 2005), Kennesaw GA.

Ross, J. W. and P. Weill, (2002). "Six Decisions Your IT People Shouldn't Make," *Harvard Business Review*, 80(11): 84-93.

Straub, D. W. and R. J. Welke, (1998). "Coping with System Risk: Security Planning Models for Management Decision Making*," MIS Quarterly,* 22(4): 441-469.

Troy, M. and M. Moller, (2004). "Human Factors in Visualization Research," *IEEE Transactions on Visualization and Computer Graphics,* 10(1): 72-84.

U.S. 107th Congress, *Sarbanes Oxley Act of 2002*. Available at www.sec.gov.

Watson, C. J. and R.W. Driver, (1983). "The influence of computer graphics on the recall of information", MIS Quarterly, 7(1): 45-53.

Whitman, M., (2003). "Enemy at the Gate: Threats to Information Security," *Communications of the ACM*, 16(8): 91-95.

MONITORING RISK IN INFORMATION TECHNOLOGY PROJECTS

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ABSTRACT

Many information technology (IT) projects fail to accomplish their objectives, come in over budget, and take longer to complete than planned. IT projects are seen as high-risk endeavors that have inherent characteristics that make them difficult to manage. This paper identifies the nature of IT project risks and suggests a way to monitor and control those risks.

INTRODUCTION

Reports of IT project failures appear frequently in the business press. In addition to these anecdotal reports, an accumulation of years of surveys and field studies confirm that IT project failures are a serious problem that regularly plague organizations of all sizes in many industries.

IT PROJECT FAILURES

Anecdotes, surveys, and field research studies establish that many IT projects fail. Managers abandon some of these failing systems. Other projects that are over budget or behind schedule ultimately result in useful systems (e.g., Anthes, 1993). However, many more projects continue long after any hope of success has faded (Johnson, 1995; Keil, 1995; Newman and Sabherwal, 1996).

Schneider (2009) concludes that IT projects are much more likely to fail than other types of projects, such as building construction projects and states that the main causes for IT project failures are their use of rapidly changing technologies, their generally long development times, and the volatility of user expectations about what the project will yield. Because IT projects generally include all of these characteristics, they are prone to failure, cost overruns, and schedule delays. Organizations need to keep IT projects on schedule and costs under control. However, organizations must also encourage managers to respond to changing business needs and exploit technological opportunities before their competitors do so (Murthi, 2002; Winkler, 1990).

SOURCES OF RISK IN IT PROJECTS

IT projects are characterized by high degrees of risk. The rapid pace of change in technologies combines changes in business processes to create unpredictable shifts in cost, the cost-benefit relationship, and the feasibility of doing specific things in particular ways (Schwalbe, 2007).

One classic problem identified in many IT projects occurs when new technologies are developed as the project is underway (Havenstein, 2007).

Whittaker's (1999) survey of more than a thousand Canadian organizations found that the main reason for IT project failure was inadequate risk management and a weak project plan. The risks faced by IT projects are not, in substance, financial risks. The financial measures are only indicators of the underlying problems. By understanding these underlying problems in real terms, rather than through their financial impact, IT project managers can move more quickly to resolve issues before they become major problems that threaten the goals of the project.

Most IT practitioners understand that there are risks other than financial risk in projects. McKeen and Smith (2003) break IT project risk into nine categories, including financial risk, technology risk, security risk, information risk, people risk, business process risk, management risk, external risk, and even the risk of success (which occurs when the project is so well done that it draws more transactions than expected and fails to scale to the overload requirements).

A TOOL FOR CONTROLLING IT PROJECT RISK

Schneider (2009) notes that post-implementation audits are valuable because they give managers an opportunity to examine the objectives, performance specifications, cost estimates, and scheduled delivery dates that were established in the project plan and compare them with actual accomplishments. In the past, these kinds of project reviews were exercises in blame assignment and often served no useful purpose because in IT projects (as distinguished from other types of projects), external forces often acted to overwhelm even the best managers (Berry, 2003; Hsu, 2003). Today, post-implementation audits are used to evaluate not just project performance, but also the assumptions made in planning the project. By including the planning assumptions in the review, the breadth of knowledge gained in these reviews is increased dramatically.

Post-implementation audits now yield reports that help managers analyze a project's overall performance, how well the project was administered, whether the organizational structure was appropriate for the project, and the specific performance of the project team members. By comparing actual results in performance, administration, and organizational structure, companies can identify important management issues. For example, some companies modify their project management organization structures after completing each project based on the contents of their post-implementation review reports (Schwalbe, 2007).

By doing a version of post-implementation reviews while the project is still underway, IT project managers can capture the effects of the high degree of variability and sensitivity to exogenous factors that are the hallmark of IT projects and incorporate the results of the review into the project continuously. Some firms are beginning to do this. For example, Njaa (2008) outlines a specific procedure for monitoring risks and overall progress in enterprise resource planning (ERP) implementation projects called project health checks (PHCs). Brandel (2008) reports a success at J.B. Hunt Transport Services with an 18-month invoicing system rebuild that incorporated a quarterly audit as a form of continuous review. Each quarter, the review team authorized changes to the project's objectives, cost budgets, and schedule deliverables based on business process changes that occurred during the project term. The $2.9 million project yielded combined additional

revenues and cost reductions worth $5.9 million at the first post-implementation milestone and has a projected benefit of nearly $20 million by 2010.

SUMMARY AND CONCLUSIONS

This paper reviews the risks that threaten the success of IT projects. Finally, the paper explains how continuous review techniques can be adapted from standard post-implementation review procedures and recommends ways to use them to improve the effectiveness of IT project managers.

REFERENCES

Anthes, G. (1993). SEC electronic filing system in high gear. *Computerworld*, 27, 59-67.

Berry, J. (2003). Assume nothing, audit instead. *Computerworld*, 37(14), 43.

Brandel, M. (2008). Xtreme ROI, *Computerworld*, 42(7), 30-33.

Havenstein, H. (2007). IT execs seek new ways to justify Web 2.0, *Computerworld*, 41(33), 14-15.

Hsu, M. (2003). How to prepare for an information technology audit, *Community Banker*, 12(9), 60–62.

Johnson, J. (1995). Chaos: The dollar drain of IT project failures. *Application Development Trends*, 2, 44-47.

Keil, M. (1995). Pulling the plug: Software project management and the problem of project escalation. *MIS Quarterly*, 19, 421-447.

McKeen, J. and H. Smith. (2003). *Making IT happen: Critical issues in IT management*. West Sussex, England: Wiley, Ltd.

Murthi, S. (2002). Managing the strategic IT project, *Intelligent Enterprise*, 5(18), 49–52.

Newman, M. and R. Sabherwal. (1996) Determinants of commitment to information systems development: A longitudinal investigation. *MIS Quarterly*, 20, 23-54.

Njaa, D. (2008) Project checkup: Periodic health checks can guide a systems implementation project along the narrow path to success. *Internal Auditor*, 65(4), 31-33.

Schneider, G. (2009). *Electronic commerce, eighth edition*. Boston: Course Technology-Cengage.

Schwalbe, K. (2007). *Information technology project management, fifth edition*. Boston: Course Technology.

Whittaker, B. (1999). What went wrong? Unsuccessful information technology projects. *Information Management & Computer Security*, 7(1), 23-29.

Winkler, C. (1990). Better Project management in uncertain times. *Datamation*, 36, 95-98.

NETWORKING IN DISTRIBUTED WORK ENVIRONMENT: ONLINE OR TRADITIONAL?

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ABSTRACT

In the age of distributed work environment, providing effective information technology (IT) support is critical when corporations are scaling back their workforces but not their presence. IT support centers and personnel have to effectively coordinate IT support events among the team members in different locations, separated by multiple time zones and oceans. The communication pattern of IT support events were described and discussed.

The researcher found that through established relationships that IT support personnel had established with colleagues (former and current) and vendors, IT support personnel may not have to be everywhere to effectively support an IT support event. IT support personnel may invoke resources associated with these established relationships to augment the presence of IT support personnel.

INTRODUCTION

To be more competitive in current challenging business environment, organizations had to lower their cost of operations, locate themselves near their clienteles, and reevaluate their organizational structures and work processes with the adoption of information and communication technologies (ICTs) (Townsend, DeMarie, & Hendrickson, 1998).

A number of studies had investigated the effectiveness of virtual teams, virtual team group processes (Ahuja & Carley, 1998; Dube & Pare, 2001; Maznevski & Chudoba, 2000; Montoya-Weiss, Massey, & Song, 2001). Such studies provided insights on team development processes but usually in ad-hoc student groups within laboratory settings rather than examining existing teams in organizations (Powell, Piccoli and Ives, 2004).

Face-to-face communication is of central significance and preferred over almost all forms of medial communication. "A medium is not only a mere (neutral) vehicle for the transmission of messages. It always has a meta-communicative meaning that has an effect on the communicated content. It is therefore significant which medium is used to distribute a message. After all, in the end the importance of a medium is connected with how credible the message transported by it is rated" (Hoflich & Gebhardt, 2005, p. 14-5). In distributed teams, coordination becomes especially problematic because team members interactions were limited to less "rich" channels such as phone, fax, e-mail, and were stretched across time zones and distance.

In this research we examined the communication of distributed teams in multi-national corporations (MNCs) and what communication challenges distributed team members faced? Specific research questions include:

1. How can the methods of communication and coordination be characterized for the distributed work environment?

2. What are typified communication patterns and their effectiveness?

This investigation utilized organizational case studies, examining the distributed IT (information technology) support teams in two organizations focusing on patterns of communication and coordination.

LITERATURE REVIEW

IT development and support is a complex social process that is communication and coordination intensive and when scaled to global dimensions, the complexity is magnified many times. "Going global" with such activities heightened these issues while adding complexities due to cultural, language, and organizational differences (Carmel & Agarwal, 2001).

An organizational unit cannot function without coordination and control; unfortunately, distance creates difficulties in both. Communication is a mediating factor affecting both coordination and control. It is the exchange of complete and unambiguous information— that is, the sender and receiver can reach a common understanding (Carmel & Agarwal, 2001; Fritz, Narasimhan, & Rhee, 1998).

Distance negatively affected communication, which in turn reduced coordination effectiveness. In distributed teams, particularly those separated by wide distances, ICTs played a vital role in enabling communication and coordination.

Communication

Communication viewed as the exchange of information between a sender and receiver and the inference of meaning between organizational participants. There are "different forms of interaction … they shape quite different organizational structures" (Weick & Browning, 1986 p. 245).

Narration, gossips, stories and storytelling were not just diversion; they connect facts, store complex summaries in retrievable forms, helped people made sense of or comprehended their complex environments. What managers said and to whom they said it created the working structure of the organization (Weick & Browning, 1986). Relationships or ties (both strong and weak) were thus established through different form of interactions.

The Chinese referred to this social networking as "quan xi" while others called it "connections." Calling on personnel's personal or professional social network was an important way tasks were accomplished in organizations. Granovetter (1983) suggested that these "connections," "quan xi" or acquaintances (weak ties) were less likely to be socially involved with one another. Weak ties were important because their likelihood of being bridges between different segments was greater than would be expected and that it was greater than that of strong ties or close friends. Pickering and King (1995) suggested that weak ties link to strong ties networks provide access to organizationally useful information.

ICT and Boundary Spanning

Organizational units like teams often have numerous boundaries, including geographic, temporal, functional, identity-based, organizational, expertise-related, cultural, historical, social, and political (Espinoza et al., 2003). Organizations with geographically distributed operations were

dependent on ICT to strengthen weak ties among the communities. In addition, organizations that depended on outside organizations for crucial inputs to production or for downstream distribution relied on ICT to facilitate inter-organizational coordination.

Organizations reaching out to larger geographical market resulted in greater reliance on IT to manage the organizations and greater interdependence within and between organizations. IT support in these organizations became more complex as more actors from diverse groups and organizations became involved in the process. Communication and coordination became more critical for the IT support staff to successfully perform their work in this distributed environment. With the outsourcing of various functions to domestic and international IT firms, team boundary issues became even more complicated. Outsourcing literature discussed how to manage outsourcing relationship at the firm level (Aalders, 2001; Aubert, Patry, & Rivard, 2002; Barthelemy, 2001), but little was said about the impact of the outsourcing on communication and coordination, particularly in the area of IT support. Outsourcing introduced organizational and geographic boundaries that may further impede communication and coordination among distributed team members.

RESEARCH DESIGN

Case studies allow for fieldwork that "retains holistic and meaningful characteristics of real-life events" (Yin, 1994). A goal of casework was to observe the details of interaction in a particular, complex single situation (Stake, 1995). Two organizations were selected for the study as the evidence from multiple cases was often considered to be more compelling and the overall study was therefore regarded as being more robust (Yin, 2002, p. 46). The names of the two organizations and their staff were changed.

Data Collection

Thirty staff from two organizations participated in the interviews. Multiple data collection methods were employed—semi-structured interviews and observation were conducted over a period of 26 months for the two organizations to create rich descriptions. Documents, electronic newspapers, and journal databases were reviewed before and after the interviews to provide background information and new developments for the two organizations. Prolonged involvement with individual team members through less formal phone conversations and e-mails also enriched the experience. The researcher spent significant time to become familiar with the structure, language and history of the corporation and the team. It also allowed research site participants to become familiar with the researcher prior to the first semi-structured interview. These preliminary meetings provided background and context for the study and helped the researcher finalize the interview questions related to the distributed IT support within a global corporate environment.
All the participants agreed to have the interviews recorded. After each interview, notes of the interview were typed and the recorded interviews were transcribed as soon as possible.

Case 1 - Hotel-Inc

Hotel-Inc was a full-service lodging and hospitality company in Hawaii managing over 50 properties in Hawaii, Australia, Micronesia, Fiji, Tahiti and New Zealand. Each Hotel-Inc property embraced the local culture to create a true sense of place for guests. Hotel-Inc had its corporate

offices in Oahu, Hawaii. Hotel-Inc had centralized services – accounting, IT, finance, engineering, purchasing, and special projects – that supported all the properties on Oahu, as well as indirectly the neighboring islands. These corporate departments work with the respective departments in each property.

Leading each property is the General Manager who had the overall responsibility of the property's profitability and room occupancy. The General Manager of the property reported to the corporate management team. The IT department took care of all IT needs of all the properties located in Hawaii. For properties outside of Hawaii, the IT department was only responsible for the initial set up of the IT infrastructure and negotiating maintenance contract with the vendor. Subsequently the IT department took on a consultative role in the day-to-day IT operations of the remote properties.

Case 2 - Navigation-Co

Navigation-Co was headquartered in California and was a leading U.S. domestic shipping carrier offering customers a wide variety of transportation services between the West Coast and Hawaii, Guam and Mid-Pacific. Navigation-Co was recognized for its industry-leading Customer Support Center and online services via the Internet, allowing customers to efficiently and effectively manage their shipment information.

Navigation-Co had a highly centralized organizational structure within a globally distributed environment. The remote offices reported directly to corporate management. The remote office IT department reported directly to the corporate IT group. It had re-aligned all IT services along business functions resulting in higher volume of coordination of business activities among the remotes sites and headquarters. As a result, coordination of IT support as well as for business operations needs tightly coupled IT arrangements.

Table 1 presents a summary of the characteristics and practices of the two case studies. Both organizations are similar in some ways and different in others. In both organizations, the organization structure is complex. Both are subsidiaries of a larger parent/holding company. Both organizations work closely with the other subsidiaries of their respective holding companies.

Category	Hotel-Inc	Navigation-Co
Organization	• Highly Complex • Centralized Management • Medium to High Degree of Formalization • Tightly coupled	• Highly Complex • Centralized Management • Medium Degree of Formalization • Tightly coupled
Locations	• Oahu, Oahu • Other Hawaiian Islands • Australia • New Zealand • Asia/Pacific	• Terminals/ports in Hawaii • Joint Ventures for terminals/ports on the West Coast • Guam • Arizona - Office • Utah - Office
Computer Operations	In house – Oahu Outsourced – Other Locations	Outsourced
PC Hardware/Software	In house – Oahu Outsourced – Other Locations	In house
Web Design	Outsourced	Outsourced

Table 1: Summary of Characteristics and Practices

Data Analysis

The case studies resulted in the collection of significant amounts of data in a variety of formats. Utilizing key words and synonyms from the constructs of the ecological framework (Sundstrom, et al., 1990), the raw data (interview and notes) was reduced reiteratively. Several iterations of data coding was performed, adding and eliminating categories during subsequent passes through the data.

Through this iterative process broad areas emerged but it did not yield the complexities involved in providing IT support in a distributed environment. To fully paint the complexities involved in coordinating and providing IT support, 19 vignettes were constructed from the interviews and observations. The interactions in the vignettes were then analyzed to look for communication patterns.

FINDINGS

Hotel-Inc and Navigation-Co used IT and ICTs tremendously though they used it differently to traverse different set of organizational boundaries. The IT support staff used synchronous ICTs when immediacy was required and asynchronous ICTs when communication was not time sensitive.

Email

The majority of the communication were done through email. Email served as a form of documentation in the communication and coordination process. Members of the team communicated through various means but it was usually followed up with an email. The email

served as documentation as to what was discussed and agreed upon by the parties involved and as a reminder to everyone.

For Navigation-Co, the emails were often sent to a distribution list. The Director of Application Development in Hawaii said that in this way everyone on the distribution list received the email and was aware of the events happening around them. The other purpose of sending emails via distribution list was to reduce and eliminate meetings. Since everyone was aware of what was happening, the need to meet as a group was reduced.

Emails was also used to pass on telephone messages in Navigation-Co. When a staff was busy, telephones messages were delivered via email. Thus, the staff was not disturbed and can respond to the messages when s/he was available. Email was view as less intrusive compared to telephone or cell phone. Cell phones were the "number one trouble maker", they were all over the place (Hoflich & Gebhardt, 2005).

Navigation-Co also equipped many of their corporate IT support staff with Blackberry. The Blackberry allowed the staff to view emails while away from the desk or office, permitting the staff to monitor and respond to email immediately. Email had become a mission critical application in most organizations. In these two case studies, email was widely used. Email was mostly used to document and share information especially when time was not a critical factor.

Instant Messaging (IM)

IM gained popularity within organizations. The Systems and Programming Manager (SPM) in Hotel-Inc used IM widely. He had as many as six IM sessions going on simultaneously. The SPM had to interface with people in different office locations, vendors/partners, and free-lance programmers. One of the advantages of the IM system was that when a person logs on, he or she can let the others know of his or her availability. Many of the Hotel-Inc IT support team members use IM as if was less intrusive than the telephone or cell phone and a cheaper alternative to long-distance phone calls. Navigation-Inc on the other hand, relies on email and Backberry to communicate with other team members. They did not use IM.

Telephone and Teleconferencing

Telephone and teleconferencing were widely used in both organizations. Navigation-Co outsourced their mainframe computer operations. The corporate IT group has daily teleconference every morning with their outsourcing vendor to discuss operational matters, any previously unresolved issues, and upcoming plans. Members of the different sub-group within the corporate IT group and representatives from the outsourcing vendors from various locations across the US participated in the teleconference. Issues were discussed and also taken offline to be discussed separately between individuals in greater detail when needed.

For both organizations, the IT helpdesk received calls from users and these calls were tracked by a trouble-call tracking system. They also have an escalation procedure and guidelines to ensure that the problems were resolved quickly and correctly routed.

Telephone was also widely used when providing IT support. It allowed users to crossed geographical boundaries giving users the impression/illusion that the other party was right there beside them. However, the telephone calls did not permit the helpdesk technician to see what kind of problems the users were having. The users had to describe as best as they could to the technician

the problems they were having. As a result, both organizations relied on IT to bridge the physical distance between the users and the IT helpdesk staff.

Weak ties were usually invoked via telephone because of urgency of the matter at hand. The vendors IT support personnel were usually on site when the hardware/software was first installed. The personnel used that opportunity to get to know one another. It was easier to call on each other for help after having met face-to-face. It was no longer just a name but there is a face and a person to associate with a name.

The task on hand and immediacy determines the type of ICT used. In addition, preference of the managers also determines the type of ICT used to a large degree.

Multi-Party Interaction in IT Support Event

The complexities involved in coordinating and providing IT support in a distributed environment for the two organizations were depicted in figures 1 and 2 respectively. The figures were derived from the analysis of the interactions of the vignettes.

The boxes in the figure represented the various parties involved in providing IT support to the user. Within the organization, these parties included the IT support staff, the corporate IT staff (IT role within firm), the staff that perform IT roles within a Business Unit, and other knowledgeable users. IT support also came from the outsourced IT support staff.

The bi-directional arrows represented the interactions. The thickness of the arrow showed the frequency of interaction, High, Medium, Low or Occasional level of interaction between the two parties. The amount of interaction between the parties was an approximation made by the participants when they were asked how often they interact with the other parties.

The interactions between the different parties were labeled from A to I for easy identification. The Multi-Party Interaction model highlighted the parties involved in an IT support event and the boundaries that are traversed when providing and coordinating IT support. Both organizations outsourced some of their IT functions, Hotel-Inc outsource all its computer operations and PC support for the properties outside of Hawaii, while Navigation-Co outsourced their mainframe computer operations. As a result, the volume of interaction between the user and the IT support within firm and the volume of interaction between the user and the IT support within outsourcer for the two organizations were reversed.

In all the vignettes from the two cases, the IT support work that was to be performed often involved more than just the user and the IT support staff. It involved IT personnel from business unit and/or outsourced IT support staff, and other users from the same or different business units. It forced the IT support personnel to span organizational, both inter-organizational and intra-organizational boundaries, functional boundaries and geographical boundaries. The IT support personnel were able to span these boundaries effectively owing to the ties, both strong and weak, that had been established by the IT support personnel with the other parties. When the need arises, the IT support personnel would call upon the resources to assist in resolving the problems.

ICT enabled the various parties to link across distance, time, departments and organizations. ICT also loosened constraints of proximity and structure in communication, making it possible for distributed parties to exchange messages with one another (DeSanctis & Monge, 1998). A variety of ICTs were used by the IT support personnel (both internal and outsourced) and users to communicate with one another. The need for highly synchronous communication forced the IT

personnel to communicate via IM and telephone while less urgent matters were communicated via email.

The weak ties between the IT support personnel and the IT support staff's circle of support were maintained through less frequent and less emotionally intense communication (telephone and occasional face-to-face meeting especially during lunch). The method of communication did not matter, but the reciprocity of the relationship mattered. Relationships that the IT personnel had developed were crucial to their success. The IT personnel took time to establish these relationships during face-to-face meetings and it made their lives more pleasant.

The two organizations outsourced a portion of their IT services but took steps within their organizations to ensure that they were continuingly adding value to the organization and justified their existence in the organization. In both organizations, the IT personnel had good working knowledge of the business processes in addition to a good grasp of technology. In this way, the IT personnel added value to the organization by recommending improvement to processes, etc. The Navigation-Co IT personnel familiarity with both the business processes and technology permit them to effectively managed outsourcing arrangement and the relationship with the outsourced vendors.

CONCLUSION

The two case studies highlighted the coordination and communication pattern in a highly complex setting. The old adage "it's not what you know but who you know that counts" held a lot of truth in a distributed work environment. The Multi-Party Interaction model depicted the pattern of interaction in an IT support event. It also depicted the complexities involved in providing IT support. IT support often involved other parties other than the IT support staff members and the user. It also suggested that resources and information that were associated with relationships or ties were essential part of communication.

The face-to-face interactions helped establish trust among the personnel. As a result, distributed team members could invoke weak ties easily through any method of communication. The interaction that took place between the different parties further helped to strengthen these relationships.

In some cases of IT support, the geographical gap may be bridged through relationships. IT support personnel may not be physically everywhere, but their influence could be. With established relationships, IT support personnel may invoke resources associated with established relationships to augment their presence.

The type of ICT used for communications was largely determined by immediacy and geographical location. Synchronous ICTs were used when the interaction was highly time sensitive. Asynchronous ICTs like email were used when immediacy was not required. Email was used extensively in both case studies as a means of documenting the IT support events, telephone discussions, etc. Instant messaging also gained popularity as it not only permitted synchronous communication but also permitted other parties to know if a person was busy, away, etc. It was not the type of ICT used rather it was the relationships that had been previously established that influenced the outcome that matters most.

LIMITATIONS

This study has both strengths and limitations. A strength of this research was that it involved intensive data gathering processing that will inform our understanding of distributed IT support in natural settings. At the same time, such an approach raises questions of generalizability from a rich local description of two organizations to other non-local organizations. This study indicated that the case sites selected do highlight some research issues while not providing much insight into others. The goal was generalization to theoretical concepts, which would require testing in other empirical settings, either through further case studies or through other methods such as surveys.

REFERENCES

Aalders, R. (2001). *The IT Outsourcing Guide*. Chichester, UK: John Wiley & Sons.

Ahuja, M. K., & Carley, K. M. (1998). Network Structure in Virtual Organizations. *Journal of Computer mediated Communication, 3*(4).

Aubert, B. A., Patry, M., & Rivard, S. (2002). Managing IT Outsourcing Risk: Lessons Learned. In R. Hirschheim, A. Heinzl & J. Dibbern (Eds.), *Information Sysetms Outsourcing* (pp. 155-176). Berlin, Germany: Springer.

Barthelemy, J. (2001). The Hidden Cost of IT Outsourcing. *Sloan Management Review, 42*(3), 60-69.

Carmel, E., & Agarwal, R. (2001). Tactical Approaches for Alleviating Distance in Global Software Development. *IEEE Software, March/April*, 22-29.

DeSanctis, G., & Monge, P. (1999). Communication Processes for Virtual Organizations. *Organization Science, 10*(6), 693-703.

Dube, L., & Pare, G. (2001). Global Virtual Teams. *Communications of the ACM, 44*(12), 71-73.

Espinoza, J. A., Cummings, J. N., Wilson, J. M., & Pearce, B. M. (2003). Team Boundary Issues Across Multiple Global Firms. *Journal of Management Information Systems, 19*(4), 157-190.

Fritz, M. B. W., Narasimhan, S., & Rhee, H.-S. (1998). Communication and Coordination in the Virtual Office. *Journal of Management Information Systems, 14*(4), 7-28.

Granovetter, M. (1983). The Strength of Weak Ties: A Network Theory Revisited. *Sociological Theory*, 201-233.

Hoflich, J. R., & Gebhardt, J. (2005). Changing Cultures of Written Communication: Letter -- E-mail -- SMS. In R. Harper, L. A. Palen & A. S. Taylor (Eds.), *The Inside Text: Social, Cultural and Design Perspectives on SMS*: Springer.

IEEE (1990). *Glossary of Software Engineering Terminology*. Los Alamitos, CA: IEEE Computer Society Press.

Jarvenpaa, S. L., & Leidner, D. E. (1998). Communication and Trust in Global Virtual Terms. *Journal of Computer mediated Communication, 3*(4).

Lipnack, J., & Stamps, J. (2000). *Virtual teams : people working across boundaries with technology*. New York: Wiley.

Maznevski, M. L., & Chudoba, K. M. (2000). Bridging Space over Time: Global Virtual Team Dynamics and Effectiveness. *Organization Science, 11*(5), 473-492.

McKerrow, R. (Ed.). (1982). *Explorations in Rhetoric: Studies in Honor of Douglas Ehninger*. Glenview, IL: Scott-Foresman.

Montoya-Weiss, M. M., Massey, A. P., & Song, M. (2001). Getting it Together: Temporal Coordination and Conflict Management in Global Virtual Teams. *Academy of Management Journal, 44*(6), 1251-1262.

Pickering, J. M., & King, J. L. (1995). Hardwiring Weak Ties: Interorganizational Computer-mediated Communication, Occupational Communities and Organizational Change. *Organization Science, 6*(4), 479-486.

Powell, A., Piccoli, G., & Ives, B. (2004). Virtual Teams: A Review of Current Literature and Directions for Future Research. *The Data Base for Advances in Information Systems, 35*(1), 6-36.

Stake, R. E. (1995). *The Art of Case Study Research*. Thousand Oaks, CA: Sage Publications.

Sundstrom, E. S., De Meuse, K. P., & Futrell, D. (1990). Work Teams: Applications and Effectiveness. *American Psychologist, 45*(2), 120-133.

Townsend, A. M., DeMarie, S. M., & Hendrickson, A. R. (1996). Are you ready for virtual teams? *HR Magazine, 41*(9), 122-127.

Weick, K. E., & Browning, L. D. (1986). Argument and Narration in Organizational Communication. *Journal of Management, 12*(2), 243-259.

Yin, R. K. (1994). *Case Study Research: Design and Methods* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Yin, R. K. (2002). *Case Study Research: Design and Methods* (3rd ed.). Thousand Oaks, CA: Sage Publications.

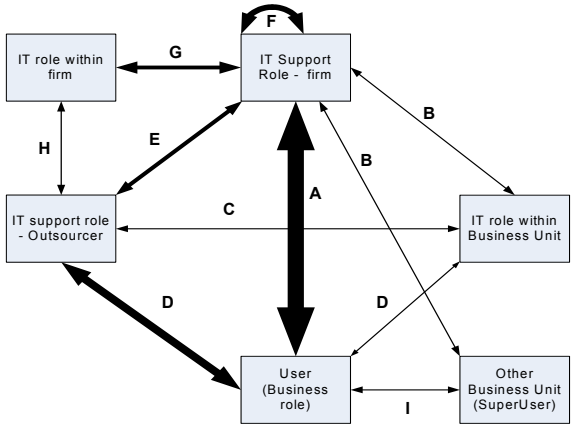

Figure 1: Multi-party Interaction in IT Support Event – Hotel-Inc

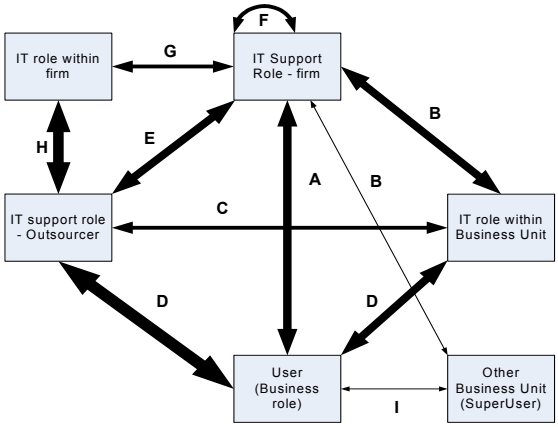

Figure 2: Multi-party Interaction in IT Support Event - Navigation-Co

HOW DOES THE INTERNET AND TECHNOLOGY EFFECT K-12 EDUCATION

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ABSTRACT

As America becomes more deep rooted in technology, it is inevitable that computers will become a part of life, especially in the classroom. It is imperative that children learn the basics and fundamentals on how to use a computer. Schools K-12 are now incorporating laptops and computer with the internet into the classrooms. Cell phones carriers have merged cell phone technology with the internet using wireless media and cell phone towers. The internet is wide spread and it is no longer accessed just by computers, now we can access the internet with mobile devices.

In the future we might not just see a computer lab in our schools but classrooms filled with computers, one for each student. What price will we have to pay if students forget about longhand and just use the keyboard, or will they be able to really learn and read from a book instead of a computer screen? Will students pay attention with the incorporation of computers in the classroom? These and many other questions are asked by researchers and parents. It is important that our kids learn how to use the computer and the internet, but do we need to replace the traditional educational methods.

CONSTRUCTING A FRAMEWORK FOR IT-ENABLED INNOVATIONS

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ASTRACT

This paper highlights the factors that affect the effective introduction of IT, knowledge and information systems, to become organizational innovations. It conceptualizes the innovation process as an open system and takes into consideration knowledge management and performance evaluation. It presents a framework for IT-enabled organizational innovations. The framework will be useful to managers in their efforts to transform their organizational operations with the use of IT.

INRODUCTION

This paper introduces a new conceptual framework of IT-enabled innovations. The framework conceptualizes the innovation process as an open system and builds on recent trends in the business and computing environments. For example, in the last decade organizations have been moving away from being rule-based systems that focus on regulating employee behavior and procedures to mission-based organizations that emphasize outcome-based measurements. This paradigm shift has allowed the creation of a managerial culture that promotes quality, openness, and innovation. Similarly, the dominant paradigm of computing has shifted from an efficiency and automation focus to effectiveness and knowledge management focus. This shift is demonstrated by management efforts to align the technological innovations with the organizational mission. The knowledge management process and organizational learning are becoming essential keys to organizational creativity and innovation (Henard, D. and M. Ann McFadyen. 2008).

The tremendous advancement in IT has provided multiple choices and strategies for implementing computing technologies into organizations. However, this flexibility is accompanied with an increased level of complexity, which in turn forces managers to increase their level of understanding of the new applications of IT. Innovative managers take advantage of the opportunities that IT can provide to add value to existing services and products and create new ones. This can be achieved by adopting an effectiveness-based strategy rather than efficiency-based strategy. Innovative managers use IT not only to streamline the existing business processes of their organizations, but as a catalyst to rethink and redesign them, establish new ones, or create a paradigm shift (Feeny & Willcocks, 1998). An effectiveness-based strategy demands more resources and faces higher resistance, therefore, executive level commitment is essential for this strategy to be successful.

An invention is an idea, product, or service that is new to the organization. Innovation is the process that allows the invention to be used in an organizational context. Innovation takes place through three overlapping stages: invention, implementation, and diffusion (Dosi, 1988). The widespread and the general acceptance of the IT into organizational operations constitute diffusion.

Therefore, for an information or knowledge system solution to be considered an innovation, the system has to be successfully implemented and accepted by the users. The system also has to enable positive change in organizational operations. While, Organizational learning provides the framework for inventing and generating ideas, an innovation and knowledge management culture, on the other hand, provides the framework of implementing and diffusing these new ideas. A culture that accepts change and has a reward system reduces organizational resistance to change, thus enabling an invention to break through organizational resistance to become an innovation.

In order to construct the framework, a mix of research tools such as interviews and experts' opinions were used. The following are steps applied to conduct this research: 1) Literature reviews to incorporate new views, specifically, focusing on knowledge management. 2) Feedback from experts to establish general validity: Five experts with diverse backgrounds provided feedback that helped establishing general validity. Specifically, they examined the overlap and relative importance of each construct in the framework. 3) In depth interviews with twenty managers in different organizations to establish relevancy and applicability of the framework. The number of interviews was sufficient. It was determined based on the consistency of managers' views regarding the applicability of the framework. Managers were chosen with extensive experience involving the use, management, analysis, and/or design of information systems. The following section presents the framework and focuses the discussion on the dynamics of the elements that impact IT-enabled innovations.

THE FRAMEWORK FOT IT-ENABLED INNVOATIONS

The proposed framework uses an open system approach in which the output is the innovation such as an information system or knowledge system and the inputs are opportunities (for example, new technology), threats (customer dissatisfaction), strengths (trainable workforce), and weaknesses (lack of computing skills), that affect the organization. There is also a feedback loop that informs decision-makers on the usefulness of the innovation in reducing threats and weaknesses or enhancing strengths and creating new opportunities to the organization. The central part of the framework includes four elements: management activities, the organizational context, the knowledge base of the organization, and IT availability. A change in any element affects all the others. The interplay among these elements determines the extent to which the system becomes an integral part of the organization's mission. For example, IT availability (reliable hardware, software applications), organizational knowledge base (designers, conceptual modeling tools), organizational context (processes, operations, users acceptance of the system) and managerial action (support innovative culture, high level of technological awareness) interact to facilitate the IT-enabled innovation.

The success of any IT/IS introduction effort depends on the managers involved in the process. For example, technology awareness and champions are very important factors for the success of the IT-based innovation. According to Curley and Gremillion (1994) champions are those "who make decisive contributions to the innovation by actively promoting its progress through the critical stages of its development and adoption." Technology awareness by managers determines the relative timing of the introduction compared with other organizations. Usually high awareness corresponds with high tolerance to uncertainty, and managers with higher awareness tend to try new ideas. The organizational context of IT-enabled innovations requires managers to evaluate potential

organizational resistance for change, and continuously scan the internal environment for opportunities for improvements.

Managers may bring IT into a unit to facilitate change in a particular task by changing the method of performing the task: to make the task easier to complete, to enhance accuracy, to achieve better access to information, and/or to obtain greater control over the task. These changes may require modifications in other elements of the organization such as the people performing the task. Employees may require training to learn the new method (thus changing the knowledge base of the organization), or they may ask for changes in their job titles to reflect their changed duties, which, in turn, impact the organization's structure (thus changing the context of the innovation).

The knowledge base of the organization must also be evaluated when introducing IT/IS into organizations. Skills, procedures, and knowledge resources that exist must be examined, new ones nurtured. Building and deploying knowledge are key components of organizational learning, a condition necessary for innovation. Continuous improvement requires a commitment to learning (Garvin, 1993). Building knowledge takes place through creating skills, model bases, documenting procedures, and streamlining standards. Deploying knowledge takes place through training, rotating jobs, attending seminars, circulating information, using on-line services, and push-servers. In order for organizations to be innovative they have to develop the ability to create and acquire new knowledge, the ability to apply it, and the ability to translate it into new ways of behaving.

There are two types of knowledge, explicit and tacit. Explicit knowledge (EK) exists in documents and databases. Tacit knowledge (TK) flows in the experiences of individuals, exists in their heads or in their group interaction and informal associations \networks. Knowledge management efforts rest on two pillars: first managing EK, which is basically adding value to an organization's articulated information resources, and second, managing employee's tacit knowledge. In order for an organization to manage TK, it must nurture and manage people who have the knowledge (on knowledge see Nonaka, 1994).

Tacit knowledge is essential in enhancing the firm's innovation performance (Harlow, 2008). Organizations can tap TK by allowing knowledge sharing in the work environment and support the sharing with IT enablers such as groupware, email, video conferencing and bulletin boards. However, managers have to provide incentives for sharing by creating a new organizational culture that rewards people for sharing their ideas. For example, organizations can institute telework as an incentive and reward structure for employees sharing their knowledge. In this sense telecommuting offers organization a way to manage talent by keeping these people working for the organization.

Also, managers need to examine the capabilities and opportunities provided by IT applications to address organizational specific problems and issues. IT tools and competences in information and knowledge management, project management, and communication, play an important role in an organization's ability to innovate (Gordon & Monideepa, 2007). There are many examples of business applications that have been either heavily facilitated by IT, such as telecommuting, or have been created by IT, such as electronic commerce, online learning, and communications.

The growing complexity of IT and its applications, make it very difficult for organizations to develop models and systems to deliver the technology. To help cope with this complex IT environment, organizations may adopt guidelines that streamline technological innovations efforts

in a performance driven culture. A key element in these efforts is to build a flexible IT infrastructure that easily adapts to new types of data, software applications and business needs.

For the purpose of implementing flexible IT infrastructure, it is useful to divide IT tools into the following three categories: 1) Creation and processing tools, such as: RDBMS, DW, Productivity, HTML, XML, Document Management, Data Connectivity, OLAP, Discovery, 2) Distribution and retrieval tools, such as: VDC, networks, intranets, WWW, mobile\remote access, search, discovery, messaging, email, and 3) Sharing tools, such as: Email, bulletin boards, groupware, instant messaging, workflow, collaborative spaces

Organizations and IT vendors are slowly acknowledging the importance of having flexibility in IT tools. For example, new tools such as XML are allowing the creation and manipulation of content in context. Organizing content in its relevant context and managing documents in this fashion improves user understanding of the reasons underlying the logic of the document. It allows instant access to themes within the document. This approach will help the user screen faster the relevant documents needed to meet his/her objectives

INNOVATION EVALUATION

IT-enabled innovations should be evaluated based on their positive transformation of the organizational processes. There are three levels of evaluation that corresponds with the process of innovation: 1) the invention stage in which the development of the system is completed, 2) the implementation stage in which users use the system, and 3) the diffusion stage in which transformation and integration of organizational processes takes place. It is difficult to evaluate the third level because the necessity of isolating the system's impacts from other intervening factors that may affect organizational processes at the time of introducing the system. At the diffusion stage, organizational outcomes could be used as criteria to evaluate the success of the organization's IT/IS-based innovation efforts. In general, to be effective is to produce the intended outcomes. What the intended outcomes of an organization are, or should be, depends on the philosophy of its management. Literature on organizational effectiveness has identified many outcomes used as measures of organizational performance (Campbell, 1977; Heffron, 1989). The organizational outcomes most directly related to IT introduction and innovation, included: productivity, quality of work life (QWL), competitive advantage, responsiveness, and accountability (Watad, 2000).

Productivity may be measured using variables such as: increasing organizational output, reducing task processing time, and reducing operations' cost. QWL may be measured using variables such as: reducing employees' stress, improving job satisfaction, and enhancing morale. Competitive advantage may be measured using variables such as: linking related services, improving quality of products, and introducing new ones. Responsiveness may be measured using variables such as: delivering products faster, maintaining updated knowledge about customers, and providing more information to more customers. Accountability may be measured using variables such as: increasing organization's accountability toward the environment, and improving organizational capacity to reduce errors. Managers can use all or part of these measures based on their focus and the intended objectives of the IT-enabled innovation.

CONCLUSION

This paper introduced a new conceptual framework of IT-enabled innovations. The framework is based on system theories and systems thinking. It conceptualizes the innovation process as an open system with a feedback loop. The central part of the framework consists of four main constructs: managerial activities, organizational context, IT availability, and the knowledge base of the organization. The dynamics of these constructs influences the effectiveness of IT-enabled innovations. Put differently, in order for an organization to improve or transform its operations with IT-enabled innovations, these four constructs must be examined and understood. The framework emphasizes the relatedness of these constructs and simplifies the complexity of the interrelationships among them. The proposed framework will help managers and practitioners see the whole picture of their organizations when adopting IT\IS to become organizational innovations; consequently, improving the decision-making capabilities of the organization.

REFERENCES

Campbell, J.P. (1977): "On the Nature of Organizations Effectiveness," in P.F. Goodman, M.Pennings, and Associates, *New Perspectives on Organizational Effectiveness*, San Francisco: Jossey-Bass, pp. 36-39.

Curley, K.F. and Gremillion, L.L., (1983): "the role of the Champions in DSS Implementation", *Information and Management*, 6, pp. 203-209.

Feeny, D. & Willcocks L., (1998) "Core IS capabilities for exploiting information technology." *Sloan Management Review*, Spring 1998.

Garvin, D., (1993) Building a Learning Organizations. Harvard Business Review. Harlow, Harold. (2008), The effect of tacit knowledge on firm performance. *Journal Of Knowledge Management*. Vol. 12, Iss. 1; pg. 148

Gordon, S. & T. Monideepa, (2007). How do a company's information technology competences influence its ability to innovate?, *Journal of Enterprise Information Management*, Vol. 20, Iss. 3; pg. 271.

Henard, David H. and M. Ann McFadyen. (2008). Making Knowledge Workers More Creative. *Research Technology Management* 51(Iss 2), pp. 40-47.

Heffron, F. (1989) *Organization Theory and Public Organizations: The Political Connection*. Englewood Cliffs, NJ: Prentice Hall.

Nonaka, I. A (1994). Dynamic theory of organizational knowledge creation, *Organization Science*, 5, pp 14-37.

Watad, M. (2000). "Information Systems Assessment in Public Service Organizations." *International Journal of Services Technology and Management* Vol. 1, No. 4.

SENIOR CITIZENS AND THE DIGITAL DIVIDE

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ABSTRACT

This on-going research examines the problems in the use of technology by the elderly, a subject that has not been adequately examined, although some previous research seems to suggest that the use of computers by seniors can significantly enhance both self-sufficiency and life-long learning. It is important to understand how technological advances can be most productively used to promote intellectual vigor, independence, and other positive attributes in this population. Several studies have shown that computers have multiple features that make them particularly conducive to use by older adults and that: (a) mastering the skills to use them effectively and (b) using them on a daily basis, promotes a sense of independence and self-reliance among this group. Other researchers continue to find new and innovative ways to implement many technological advances to assist older persons in becoming active users of technology.

In the study presented here, a survey was developed to collect data from a cross-section of the senior population of New Orleans, Louisiana and its environs. Research is ongoing, but in addition to a demographic profile, the initial study found that, despite receptivity to technology, there are problems of access and availability. Hopefully, the findings provide sufficient data for development of a prototype to address the problems identified. As the older population continues to increase, both interest in and the potential impact of these findings and developments are significant.