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Table of Contents

A PROJECT MANAGEMENT OFFICE (PMO)
FRAMEWORK FOR SUCCESSFUL
IMPLEMENTATION OF INFORMATION
TECHNOLOGY PROJECTS 1
Chris Kaufman, Agovia Consulting
Raghu B. Korrapati, Walden University

DOES QUALITY PAY: A DEA STUDY OF THE
MOTOR CARRIERS' PERFORMANCES 7
Patrick Lee, Fairfield University
Patricia Poli, Fairfield University

INTERSECTION TRAFFIC ACCIDENT DATA
MODELING AND ANALYSIS: EMPIRICAL STUDY
IN CITY OF NORFOLK, VA 9
Sharad K Maheshwari, Hampton University
Kelwyn A. D'Souza, Hampton University

OUTSOURCING TO INDIA: ADVANTAGE OR
DISADVANTAGE? 15
Ashish Oza, Sam Houston State University
Kathy L. Hill, Sam Houston State University

AN ANALYSIS OF WORLD-WIDE BUSINESS SCHOOL
RESEARCH PRODUCTIVITY IN PRODUCTION AND
OPERATIONS MANAGEMENT 21
Tony Polito, East Carolina University
Jose Gavidia, College of Charleston

COMPUTATIONAL PROTEIN SEQUENCES ANALYSIS
FOR DIABETIC RETINOPATHY
– A BIO INFORMATICS STUDY 23
Ch. Divakar, GITAM Engineering College, India
Allam Appa Rao, Andhra University College of Engineering, India
Raghu B. Korrapati, Walden University

INFORMATION TECHNOLOGY LEADERSHIP
PERCEPTIONS AND EMPLOYEE-CENTRIC
ORGANIZATIONAL CULTURES 29
Michael W. Sebastian, Walden University
Raghu B. Korrapati, Walden University

IMAGE COMPRESSION AND FEATURE EXTRACTION WITH NEURAL NETWORK	33
Dinesh K. Sharma, University of Maryland Eastern Shore Loveleen Gaur, BLS Institute of Management Daniel Okunbor, Fayetteville State University	
QUADRATIC ASSIGNMENT MODEL WITH MULTIPLE GOALS FOR THE DESIGN OF HUMAN-COMPUTER INTERACTION	39
Dinesh K. Sharma, University of Maryland Eastern Shore S. K. Peer, K.S.R.M. College of Engineering K. Ravindranath, S.V.U. College of Engineering M. M. Naidu, S.V.U. College of Engineering	
DISTANCE LEARNER EXPECTATIONS FOR QUALITY, TECHNOLOGY-ENABLED, STUDENT SUPPORT SERVICES	45
Kathleen O. Simmons, Walden University Raghu B. Korrapati, Walden University	
KNOWLEDGE SHARING AND CULTURAL DIVERSITY AMONG IT PEOPLE: IMPLICATIONS ON KNOWLEDGE MANAGEMENT INITIATIVES	49
Mahmoud M. Watad, William Paterson University of New Jersey Cesar Perez-Alvarez, William Paterson University of New Jersey	
KNOWLEDGE SHARING IN A HUMAN RESOURCE COMMUNITY OF PRACTICE	55
James D. White, Walden University Raghu B. Korrapati, Walden University	

A PROJECT MANAGEMENT OFFICE (PMO) FRAMEWORK FOR SUCCESSFUL IMPLEMENTATION OF INFORMATION TECHNOLOGY PROJECTS

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ABSTRACT

One of the strategies for successful implementation of large software projects is the establishment of a Project Management Office (PMO). Project Management Office adds momentum to continuous process improvement, identify and mitigate risk early in software development life-cycle, and manage cost through the application of applied project management methodology. The implementation of best practices in project management has greater impact on the project success for on-time and on-budget. In this research paper, we propose a PMO Framework for successful implementation of Information Technology (IT) projects.

Project Management Office (PMO) – The Concept

The concept of a distinct organizational entity within an enterprise dedicated to project, program, and portfolio management has gained a vogue and momentum in the past several years. In common parlance, these entities are referred to generically as “PMOs”.

Business trends cast shadows in terms of discussion in industry literature. An illustration of this trend is provided by a search for articles generated by the research and consulting firm Gartner for the past five years. A search of the Gartner research using the criteria “PMO” reveals the following:

Year	Article Count
2002	1
2003	1
2004	5
2005	12
2006	50

The increasing interest in PMOs is indicative of the value businesses are placing on the management, control, and business results expected from the projects and programs intended to bring about necessary business change. This interest may be driven from the low success rates of information technology projects (~ 30 – 35 %) (ref) or from the increasing press and “buzz” associated with the PMO concept.

PMO – The Four Challenges

What is clear, however, is the increasing acceptance of the need for mechanisms to increase the chances of success of IT and enterprise projects and programs as indicated by the willingness

to provide funding for such “overhead-heavy” entities. This places PMOs in the “triple threat” position of:

1. High Expectations. It is hoped and expected the PMO will solve the decades-long enduring challenge of high project failure rates;
2. Flavor of the Month: The PMO is the latest “airline magazine buzz” from which consultants can expect to derive significant income, and with which internal enterprise sources have significant experience and which deservedly have achieved a Dilbert-ish aura (i.e. BPR, TQM, ITIL, MBO, Workflow Management, etc.)
3. Enterprise Critical Path: The PMO has been placed in the pivotal role of facilitator of the success of the business (ref).

As with most of the previous programs mentioned above, (BPR, TQM, etc.), the PMO is a strong and valid concept and can provide value to the enterprise if created and managed correctly. Additionally, the success or failure of the PMO (and the changes it is mandated with providing) will be driven and determined by the strength and success of the organizational management of the concept rather than the strength of the concept itself or the internal management of the PMO.

In addition to the three challenges shown above, a fourth and overarching cultural challenge must be acknowledged. Although the PMO as an articulated concept is relatively recent, all of the activities associated with it have been occurring in all companies that incur any level of change (read: all companies). These functions may have been more or less formalized in one or more places, from various committees to the back side of envelopes to a tattered sheet of notebook paper in the CEO’s desk drawer. The act of creating a PMO, however, transfers some or all of this control to a bureaucratic entity and inevitably creates (at a minimum) the perception of loss of power. Even if, intellectually, the executives chartering the PMO understand the need and the benefits, the gut-level loss of control can lead to cultural resistance, “under-the-radar” projects and an eroding lack of effectiveness. This cultural reaction must be dealt with by exchanging value and success for the perceived loss or the PMO is at risk.

PMO - A Framework for Success

In order to provide for the greatest possibility of success of the PMO and, in consequence the success of the changes necessary for business improvement a framework of five elements is recommended. It will be noted that the described framework provides for combination of types of elements to increase the odds of a successful PMO. Whereas many discussions of this subject focus on the Domain and mechanical requirements for a successful PMO, the potential highly political nature of this venture require an equal focus on the cultural and capability oriented parts of the framework.

The necessary elements fall into four types:

1. Organizational: Mandate, charter, scope
2. Philosophy: Results Focus
3. Mechanics: PMO Operations
4. Domain Competency
 - a. Portfolio Management
 - b. Project Delivery

The relationship of these elements is shown in the below diagram (Fig 1):

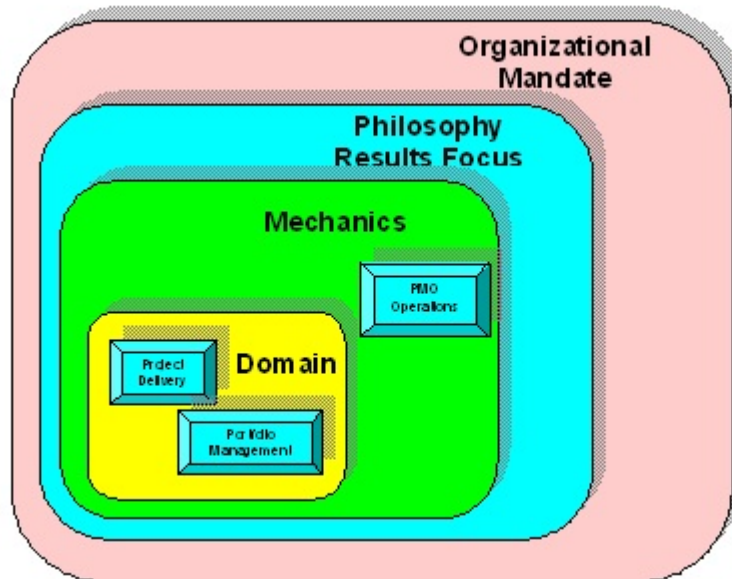


Fig 1. Framework

Framework 1: Mandate

Framework type: Charter/Scope/Organizational Development

As mentioned above, the PMO has become a generic name for organizational structures responsible, at some level for the success of projects, programs, and portfolios. It is critical to the success of the PMO that this organizational mandate and desired outcome of the PMO is clearly articulated. This is important on a number of levels including but not limited to guidance for funding and focus, as well as organizational acceptance and support.

There are four major levels at which a PMO can establish its level of operational focus. Each of the below assumes incorporation of the previous level:

1. Project Management Office
 - a. Focus: Successful delivery of projects: On time, on budget, to scope. At this level, the PMO receives project requests from other entities and maintains a minimal level of portfolio awareness and challenge only to the level it provides for insight into dependencies and allows for resource management.
 - b. Orientation: Execution
 - c. Potential Cultural Challenge/Disruption: Low
2. Program Management Office
 - a. Focus: Successful delivery of both projects and programs (programs: multiple projects coordinated for a single outcome). The program level PMO maintains most of the same characteristics of the project level PMO with an increased need for sophistication and expertise.
 - b. Orientation: Execution
 - c. Potential Cultural Challenge/Disruption: Low
3. Portfolio Management Office

- a. Focus: Construction of a portfolio and delivery of business results designed to achieve the business goals of the organization as well as quality execution of projects and programs. The portfolio level PMO can manifest itself in at number of levels from illustrative to driving to results. This level of PMO implementation has the highest potential for misaligned or unmet expectations and thus the highest need for clear definition.
 - b. Orientation: Business Results and Execution
 - c. Potential Cultural Challenge/Disruption: High
4. Planning and Portfolio Management Office
- a. Focus: Bidirectional interaction with the management team in the creation of plans, development of the portfolio, and delivery of business results as well as quality execution of projects and programs. At this level, the PMO is a driver of result and is clearly mandated with the organizational approval for challenging, questioning, and facilitating the development of prioritization methods and achievement as well as gating metrics and mechanics. Paradoxically, the level of risk associated with this manifestation of the PMO is reduced due to the close association with the senior levels of management that are inherent in this model.

It is important the level of mandate and charter be clearly articulated by the key management entities in order to minimize cultural resistance to the PMO. This is true in two major avenues: Driving to results and scope of project types (IT only or enterprise wide). This is especially true at the level of the Portfolio Management Office. If the portfolio of projects is expected to achieve the desired outcomes of the organization, the PMO has moved de facto into driving priorities, dependencies, and line-of-site project-to-end-state outcomes. Without clarity and organizational approval for the processes of questioning, measuring, gating, etc. organizational backup behavior can result.

Framework 2: Philosophy – Results Focus

Framework type: Orientation/Philosophy

The PMO in what ever manifestation it takes must be created on an underlying philosophy or culture of results. The PMO as a specific entity has grown out of the IT organization in most companies. This origin has led to a high dependence on process and methodology, often to the diminishment of focus on results. As a response to ad hoc development projects and project implementations, several project methodologies and process frameworks have been developed and implemented by IT organizations.

The results of these methods and frameworks, whether PMI-based, ITIL-based, or of other more proprietary origination has been mixed. Some documented incremental improvements have been shown through various studies. However, simultaneously, a certain “cookbook” execution mindset has developed that results in project and program managers focusing more and more on “deliverables” (Opportunity Evaluation Form, Preliminary Approach Documents, Scope Documents, PCRs, Issues Logs, Risk Logs, Work Breakdown Structures, Change Management Logs) rather than results. The essential mechanical elements of project success, while certainly necessary are no longer enough. The focus on these elements, while providing some undeniable benefit has had at least two unintended results. These include the increasing costs of projects due to management infrastructure and overhead (usually without clear ability to document the beneficial trade off for the expense and sometimes causing orders of magnitude increases in cost – especially on smaller projects) and the frustration of sponsoring managers with the inability of project personnel to communicate in terms of outcomes rather than project esoterica.

PMOs at all levels must be chartered to execute and communicate in terms of outcomes and results, both at the project/program level and at the business results level.

Framework 3: Mechanics – PMO Operations

Framework type: Role/PMO Organizational Model

A successful PMO Management relies on people who are performing in clear defined roles. Documented roles on who does what in relation to overall project goals are useful to ensure that members of the PMO understand what is expected of them. Roles also can ensure that all of the obligations and responsibilities of the PMO are covered.

Framework 4: Domain Competency - Portfolio Management

Framework type: Role/PMO Organizational Model

The PMO, if it is mandated with a level of portfolio management will develop competency in this domain. This activity or competency stream is one of the two classically considered in the bailiwick of the PMO. Portfolio Management is largely a governance function within the PMO and enterprise. This role will be responsible for the following:

- Construction and maintenance of the project portfolio
- Consulting with business sponsors and contacts for portfolio planning and forecasting
- Ongoing project demand management
- Knowledge, awareness, and communication of project/program dependencies, interactions, and limiting resources
- Prioritization of projects and programs
- Project gating criteria discussions and impacts
- Management of the governance and advisory bodies
- Portfolio results metrics, measurement, and reporting (decisions on this front regarding results in terms of projects per se versus the ongoing results and costs of completed projects are important to defining the scope and resource needs of this function).

Framework 5: Domain Competency - Project Delivery

Framework type: Role/PMO Organizational Model

When the PMO initially envisioned by the management team of an organization, this domain competency is usually what they have in mind. A strong desire for predictable delivery of projects to scope, time, and budget is the clear and obvious driver that all managers intuitively understand and desire. This role is responsible for the following:

- Successful delivery of projects: Budget, time, scope, quality
- Ownership of project/program methodology
- Staffing and direct or matrix reporting of project personnel including staff augmentation
- Balancing project personnel
- Project reporting to sponsors and others as appropriate
- Ongoing project monitoring
- Runaway project turn around
- Project audits

Project training and education
Project post mortem, ongoing improvement processes

SUMMARY

Successful implementation of the PMO framework within an organization requires Executive Sponsorship and management to identify a strategy for success. Project Management Office adds momentum to continuous process improvement, identify and mitigate risk early in software development life-cycle, implementation of best practices / lessons learned, and manage cost through the application of applied project management methodology.

DOES QUALITY PAY: A DEA STUDY OF THE MOTOR CARRIERS' PERFORMANCES

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ABSTRACT

The Motor Carrier Associations surveys include data on revenue and the quality performances of on-time ratings, as well as equipment ratings from their corresponding customers. In addition, the costs of parts, tires, maintenance, and on-site maintenance are also kept. Poli and Scheraga's DEA study examined the impact of costs against the motor carriers' quality ratings, while the input costs were then scaled by their corresponding revenues as a normalization process.

The current study extends the DEA study to investigate whether the quality leaders are also revenue leaders. The two respective DEA analyses are then used to compare with the joined (quality ratings and revenue) DEA analysis. That is, empirically, we would examine whether the decision-making units (observed data points) on the DEA's efficient frontiers of both the quality, and revenue constitute a necessary and sufficient condition for the efficient frontier of the joined DEA analysis.

Keywords: Data Envelopment Analysis, Decision-making units, efficient frontier, and quality.

INTERSECTION TRAFFIC ACCIDENT DATA MODELING AND ANALYSIS: EMPIRICAL STUDY IN CITY OF NORFOLK, VA

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ABSTRACT

The objective of this research is to develop statistical predictive models for vehicular traffic accidents at the city intersections. The research hypothesizes that there are some controllable factors that contribute to traffic accidents on specific intersections. Therefore, delineation and subsequent improvement of these factors should improve the traffic safety at a given city intersection. With this objective in perspective, the analysis was performed in three simple steps, selection of intersections, traffic volume and regression model.

Intersection safety is viewed as a high-priority/high-payoff area by the Research & Technology Partnership members since 50% of all crashes occur at intersections (National Highway R&T Partnership, 2002). Congestion can be often attributed to crashes at intersections. Congestion chokepoints existing in the cities can be identified through traffic flow and accident analysis at the different intersections.

This study analyzed historical accident data at different intersections within the City of Norfolk, and developed underlining statistical patterns in the accident data. The structural factor included variables such as area topography, lane patterns, type of road signs, turning lanes, etc., the administrative factor included variables such as signal types, signal polices, road closures, etc., and maintenance factor included variables such as road conditions, condition of the signals, condition of road signs, etc. The information derived from the accident analysis could assist in improving road structures, road conditions and/or modify the administrative policies to reduce accidents and congestion at intersections.

LITERATURE REVIEW

Automobile accidents contribute to large number of deaths in United States. According to the Insurance Information Institute, New York (Hot Topic and Issues Update: Auto Crashes, 2006), 42,636 people died in motor vehicle crashes in 2004 alone and an additional 2,788,000 people were injured. There were over 6 million police reported auto accidents in 2004. It is reported that about 50% of crashes occur at the intersections (Hakkert & Mahalel, 1978; National Highway R&T Partnership, 2002). It is obvious from everyday experience and has also been reported extensively in the literature that traffic volume is the major explanatory factor for traffic accidents (Vogt, 1999). However, studies have been carried out showing that design and other related factors contribute towards 2% - 14% of accidents. Vogt (1999) provides a good review of the factors which have been considered in past research studies. These factors include channelization (right and left turn lane), sight distance, intersection angle, median width, surface width, shoulder width, signal characteristics, lighting, roadside condition, truck percentage in the traffic volume, posted speed, weather, etc. Beside these factors, researchers have also considered other minor details such as surface bumps, potholes, pavement roughness, pavement edge drop-off, etc. (Graves, et al., 2005).

The relationship between the accidents and the possible factors is usually established using multivariate analysis (Hakkert & Mahalel, 1978; Vogt, 1999). In a FHWA study by Harwood, et al., (2000), quantitative data on accidents and other factors were combined with the expert's judgment about design factors as well as expected impact of these design factors on the accident rate. In recent years, several studies have applied data mining techniques along with statistical modeling to determine the impact of major factors like traffic volume and road design characteristics along with minor factors such as pot holes and surface roughness. Graves, et al., (2005) reported about the impact of pot holes and surface roughness on the accident rate. However, due to paucity of data a clear link could not be established between these surface factors (pot holes, roughness, etc.). Washington, et al., (2005) performed an extensive study to validate previously reported accident prediction models and methods. Validation was performed using recalculation of original model coefficients, recalculation using of additional year data, and recalculation using data from a different state. The study reported that beside traffic volume other factors should be considered on a case by case basis for a given site. Most recent studies have focused on statewide data and based on the rural highways. The traffic pattern and other factors may differ at rural and city intersections. Furthermore, before and after studies may be less valuable in rural settings as road design changes are not made as often as in a city with growing traffic volume.

MOTIVATION

The most traffic accident analyses are based on a larger geographical area like one or more states. The focus of this research is to apply the statistical or other model in a medium size city. This can help the city to better analyze its own accident pattern and take certain corrective actions. The City of Norfolk, VA agreed to participate in our study. The initial study was concentrated on certain selected intersections of the City. For the intersection selection purpose, signalized intersections in the City were ranked on the basis of accident rates, congestion and other factors, and the top 10-15 were selected for detail analysis. The primary objective of the study is to develop a predictive statistical model for intersections within the City that identifies the impact of major contributing factors (and their interactions) on the accident rate.

DATA COLLECTION

The research focused on the City of Norfolk, Virginia. The City has a traffic accident database in an electronic format documenting incidents for the past 11 years. Certain types of accidents (like multi-vehicle) could not be imported to the available database for this research program. The City's database is developed from police accident reports. Hence, any traffic accident where a police report was not filed is not included in this database. The information collected from police reports was subsequently entered in the City's accident database ('94-'04.)

The Commonwealth of Virginia collects and maintains data on traffic volume on the primary roads in every locality of the state. Traffic volume data on secondary streets (collector and local) is not directly available from the State's database. This research program used the average daily traffic volume data published by the Commonwealth of Virginia. The City does not maintain longitudinal data (data over a period of time) on road conditions, road improvement (barring major changes), signaling policy changes, road maintenance schedules, etc. As past data for these factors was not available, traffic volume data was collected for the four-year span from 2001-2004. The traffic volume data for all collector and local roads was not available in the State's published reports; hence five of the top 15 intersections were dropped (See table 1 for final 10 intersections.)

Data on physical attributes of each of the ten intersections were collected through direct observations. The physical attributes included number of lanes, type of lanes, type of turn signals,

existence of median and shoulder, pedestrian crossing, number of driveways with 250' of the intersection, and other safety features

Table 1. Top 10 Intersections Based on Cumulative Number of Accidents from 2000-2004

No.	Street 1	Street 2	Abbreviation
1	VA Beach Blvd	Military Hwy	VM
2	Hampton Blvd	Int. Terminal Blvd	HI
3	Little Creek Road	Chesapeake Blvd	LC
4	Little Creek Road	Granby Street	LG
5	Military Hwy	Noview Ave	MN
6	Little Creek Road	Tidewater Drive	LT
7	Military Hwy	Azalea Garden Rd	MA
8	Little Creek Road	Hampton Blvd	LH
9	Tidewater Drive	VA Beach Blvd	TV
10	Brambleton Ave	St Paul Blvd	BS

ANALYSIS AND RESULTS

Step 1: The selection of the intersections for analysis was made using the *crash frequency method* (Pawlovich, 2002), where all intersections were ranked according to the total number of traffic accidents. An accident within 250 feet of an intersection was considered *intersection related accident* (Hardwood, et al., 2000). For currency purposes, the last five years of available data (2000-2004), was used to rank the top 10 intersections. For these 10 intersections, the previous 6 years of data (94-99) were also analyzed to look for linear trends in the accident rate.

At the two intersections statistically significant (linear regression coefficient being significant at 5%) trends exist. These intersections include (1) Hampton Boulevard and International Terminal Boulevard (HI) and (2) Brambleton Avenue and St Paul's Boulevard (BS). The Hampton Boulevard and International Terminal Boulevard trend shows a general increase in the number of accidents over the past 11 years. Conversely, the Brambleton Avenue and St Paul's Boulevard trend shows a decrease in the total number of accidents over the years. It was noted that both these intersections did not have any major roadway improvements in the past several years.

The traffic volume was computed using the Annual Average Daily Traffic (AADT) data published by the Commonwealth of Virginia. The total AADT at an intersection is the sum of the average of AADT for the each highway as follows:

$$\text{Intersection total AADT} = \{[(\text{Traffic Volume Approaching the Intersection from Direction 1} + \text{Traffic Volume Leaving Intersection from Direction 1})/2] + [(\text{Traffic Volume Approaching the Intersection from Direction 2} + \text{Traffic Volume Leaving Intersection from Direction 2})/2]\}$$

Step 2: At this stage of the analysis, it was important to establish the relationship between traffic volume and accident frequency. Using an analogy from reliability analysis, a failure of a system could be considered as an accident. To assess the reliability of system a Mean Time Between Failures (MTBF) is calculated; similarly to assess the safety (reliability) of traffic system, the mean number of vehicles between accidents can be calculated. In other words, it calculates an average number of vehicles passing the intersection between two accidents. If the safety standards are increasing at an intersection, the mean number of vehicles between accidents must increase.

The mean number of vehicles between the accidents varies significantly from one intersection to another. This is possibly due to several factors including the capacity of the highway.

However, an increasing or decreasing trend in the mean number of vehicles between the accidents on a specific intersection may signify a change in some of the road conditions, traffic control changes, or other engineering changes at the intersection. Three intersections (1) Little Creek Road and Chesapeake Blvd (LC), (2) Military Hwy and Norview Ave (MN), and (3) Tidewater Drive and VA Beach Blvd (TV) show lower trends, i.e., the mean number of vehicles between the accidents is decreasing or the traffic accident frequency compared to traffic volume is increasing, where as the intersection of Little Creek Road and Granby Street (LG) shows a higher trend in mean number of vehicles between the accidents. Other intersections do not show distinctive increasing or decreasing trends.

Step 3: To test the significance of change in the mean number of vehicles between the accidents, the Student-t test was performed. It must be noted that sample size (4) is very small for each intersection. The average and standard deviation of mean number of vehicles between the accidents for the 10 intersections was calculated. Due to lack of data, mean number of vehicles between the accidents was not significant at many points. It is partly due to the fact the sample size is very small for the t-test.

Step 4: The physical intersection attributes were included in this step. In absence of any longitudinal and design data, the statistical inference drawn is very limited. The physical attribute data set contains 56 physical attributes and traffic volume AADT is an additional independent variable. This make a total of 57 independent variables with a date set of 10 locations. However, certain independent variables could be eliminated as these variables did not vary at the intersections under consideration. The variables eliminated were shoulder variables since there was no shoulders anywhere on the intersections under investigation expect for a shoulder on one leg on an intersection. Similarly, signal variables for no right turn on red, restricted red turn light, and extra hazard on minor road were eliminated as there were either no differences, or just one intersection had a different value for these variables. Despite the elimination of these variables, there were still 39 independent variables with 10 data points.

The dependent variable (ACCAVG - average number of accidents over the period of 2000-2004) was the accidents reported and recorded within 250 feet of the intersection. Hence, it was imperative that the independent variables also reflect intersection-based data rather than data on each leg of the intersection. The available variables were reduced to eight independent variables for an intersection as shown in Table 2.

Variable	Definition
AADT	Annual Average Daily Traffic ('000) at The Intersection
LANE	Total Number of Lanes at The Intersection
TURN	Total Number of Turn Lanes at The Intersection
MEDN	Total Number of Physical Median at The Intersection
PEDN	Total Number of Pedestrian Crossing at The Intersection
DRWY	Total Number of Driveways at The Intersection
HZRD	Number of Legs with Extra Hazards at the Intersection
EXSF	Number of Legs with Extra Safety Features at the Intersection

As indicated earlier, the data set was too small for confident statistical predictive model. Hence, all six variables are kept in the model despite some of the variables being statistically not significant. The equation of the linear regression line is shown below.

$$\text{ACCAVG} = 2.14 - 0.76 * \text{LANE} + 2.02 * \text{TURN} - 0.10 * \text{AADT} + 0.41 * \text{DRWY} \\ + 7.48 * \text{MEDN} - 2.19 * \text{PEDN}$$

The linear model is significant and is explaining 89.8% of variability in this small data set under consideration.

CONCLUSIONS AND LIMITATIONS

This research program planned to determine associations between road accidents at a city's intersection and controllable factors such as road design, signal policies, and other data. The main focus was to rely on longitudinal data to find out how previous changes in design, road side objects, signal policies, and other similar factors have impacted the accident rate in the City of Norfolk. The study expected to replicate some of the previously published statewide work like (Vogt, 1999) and develop a predictive statistical model for accident rate for intersections in a specific city. However, this research program has limitations due to several reasons. It lacks statistical validity due to unavailability of longitudinal data. For statistical analysis purposes, before and after data for each intersection were not available at the time of study to establish a relationship between improvements and accident rate. Data on each road changes and improvements need to be collected over three to five years. Moreover, signal policy changes and other major and minor road maintenance data should also be collected over time to show effectiveness of each change on the accident rate. Nevertheless, the analysis shows that traffic accidents and these factors have a relationship that could be useful for traffic engineers planning traffic projects within the City.

REFERENCES: Provided upon request.

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OUTSOURCING TO INDIA: ADVANTAGE OR DISADVANTAGE?

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ABSTRACT

Many companies around the world are adopting the practice of outsourcing their activities to the Far East developed and developing countries. Outsourcing of manufacturing operations started back when many companies started to invest in China and now have their manufacturing operations there. However, the current trend of outsourcing focuses on outsourcing company's non-manufacturing activities. This paper discusses the relationship between the U.S. and India involving outsourcing of products, jobs and services. It points to some reasons for India being the winner in attracting companies across the globe to outsource their non-manufacturing activities. Finally, some of the advantages and disadvantages are discussed.

INTRODUCTION

Outsourcing can be defined as turning over all or part of an organizational activity to an outside vendor. Outsourcing is often seen as a tool of cost cutting where companies move their jobs to an outside vendor on an ongoing basis. These services were initially provided internally by that organization. The pressure of the current market forces and the price wars have forced many companies to reduce cost by outsourcing its non-core activities to low wage countries in Asia. A cost cut of any manner can change the company's position in the market. Companies with low cost leadership are able to gain the potential market share.

Thus in the current global economy, it is important for companies to find ways to accomplish more with less resources. Globalization is the search for markets to sell products and services at the higher prices and to procure products and services at the lowest prices. One of the ways for a company to do this is through outsourcing.

The first sign of outsourcing was witnessed by the manufacturing industry, and China emerged as the winner in terms of attracting jobs and foreign investment. At this stage of outsourcing, it was common for a company to have its manufacturing plant in the Far East or Mexico to take the advantage of cheap labor. As outsourcing become more widespread, more and more functions were capable of being outsourced. The biggest boom in outsourcing was observed when service activities were outsourced. Outsourcing worldwide has now topped US \$1 trillion per annum (Lyons, 2001).

According to Gartner 2003, all US enterprises will have to consider global delivery sourcing as one of their top strategic sourcing options. In the service industry, outsourcing was initially restricted to basic support activities but recently outsourcing has entered all non-core service functions. In 1997, 34% of firms outsourced all or part of their information technology (IT) and this proportion is expected to increase to 58 % by the year 2010 (Barthelemy, 2003). Similar increases are expected for activities such as telecommunication, accounting and human resources.

The purpose of this paper is to discuss the relationship between the United States and India on the outsourcing of products, jobs, and services and to discuss some other aspects of the relationships between the two countries.

LITERATURE REVIEW

Amoribieta, Bhaumik, and Parkhe (2001) provide insight on the development of software in foreign lands. In their study they identify, India has the most popular hub for outsourcing because it combines high quality with low cost. They provide some of the other reasons for companies to outsource IT operations. They, then, point out the necessary precautions a company needs to take before outsourcing in a foreign country. Their study identifies the importance of the partnership between the two companies and concludes that a successful offshore software development project requires a high degree of due diligence and commitment.

Barthelemy and Adsit (2003) provide an in-depth view on outsourcing non - core activities, such as Information Technology (IT). The study also focuses on India and identifies it as the world's favorite IT outsourcing destination. The study further provides opportunities offered by India in the field of outsourcing along with the challenges companies face that decide to outsource their IT operation. Deavers (1997), also, provides insight on many other factors apart from cheap labor which attracts companies to outsource their non - core activities. The study explores several other factors such as rapid change in technology, increase risk along with flexibility, and globalization which work simultaneously to increase outsourcing. Lyons (2001) states that globalization is the key economic, political, social, and technological driver. The paper discusses the various trends in outsourcing and links the two corporate trends - globalization and outsourcing. Ribeiro (2001) provides an in-depth view of outsourcing to the most preferred location, India. He states some of the advantages of outsourcing to India and concludes that low cost and high return in quality and experience are the major advantages. The study explains the advantages companies can have with outsourcing to India by studying the case of 24/7 customer.com which is a leading service provider for many companies in the United States looking to outsource to India.

REASONS AND EXTENT OF OUTSOURCING

Initially companies outsourced their non-core activities because this helped them to focus on the core business. Since building core competencies and serving customer needs is critical to a firm's success, anything that detracts from the focus may be considered for outsourcing (Quinn and Hilmer, 1994). Non-core activities were gradually being outsourced for two reasons. First, outsourcing non-core activities allows firms to focus on the activities they do best and improve their overall performance (Dess, 1995). Second, transferring non-core activities to specialized vendors can help reduce the cost and improve the performance of such activities (Leiblien and Dalsace, 2002). Outsourcing is generally considered as a very powerful tool to cut costs and improve performance. The principal idea behind outsourcing is to obtain services of specialist who will perform the function better at a lower cost. A series of studies conducted by the Outsourcing Institute since 1991, including surveys of more than 1,200 companies, suggest that companies have various reasons for outsourcing, and the top five reasons were identified as:

- Improve Company Focus
- Access to World-Class Capabilities
- Accelerate Benefits from reengineering
- Share Risks
- Free Resources for other Purposes (Outsourcing, 2007)

Companies are increasingly outsourcing the development and management of information systems and information technology for reasons such as specialized skills, cost, staff utilization, reduced recruitment and training, and a high standard of control and security and proliferation of information systems. (Dowing, Field and Ritzam, 2003) Although local outsourcing to software

firms in the United States may be possible, companies can gain an advantage of cheap labor prevailing in Far East Asian countries. A company can save up to 60 to 70 percent if it selects to offshore its IT and support activities to these countries. Since the cost of labor is related to the supply, and they are directly proportionate with each other. Thus there would be a shift in the labor market towards countries having larger number of professional graduates to other countries.

India and China are graduating more professionals than from any other low wage countries. Both the countries have a low wage advantage over other countries. Because of the lower salary expectation and more and more engineering graduates from India and China, major US companies are shifting jobs to these countries (National Science Foundation, 2006).

According to a research by Forrester Research (2003), the number of jobs moving out of the United States would increase from 600,000 in 2005 to 1.6 million in 2010 and 3.3 million in 2015. This movement of jobs would be to low cost countries and top of the list is the most preferred location for outsourcing, India. The research also indicated that nearly 85 percent of outsourcing is done in India. Cheap labor, higher number of engineering graduates, and low cost has resulted in these countries being the favorite outsourcing locations. India stands out against China due to its higher service quality and also larger number of English speaking graduates. Nine out of ten executives, surveyed by A T Keamey in 2002, a global management consulting firm, said they intend to move certain non-manufacturing business processes to low-cost offshore locations. The most popular destination according to this survey is India, with almost a quarter of the respondents opting for it, followed by China with 15% and Mexico with 13% (Yost & Harmon, 2002).

INDIA: BACK OFFICE TO THE WORLD

A large number of companies are going offshore to develop and maintain their software: GE, Bank of America, Target, and American Express for example have formed partnerships with Indian firms such as Tata Consultancy Services, Wipro, & Infosys. A recent survey by the Indian National Association of Software and Service Companies found that almost two out of five Fortune 500 companies currently outsource some of their software requirements to India. The reason for this according to most research is that it saves time, money, and better work ethics; thus, India is ahead of competitors such as China. There are many reasons for India getting the Lion share of outsourcing. Cost is the chief reason for sending business to India. But the country's abundant manpower has made India a target destination for multinationals to back end their operations in India. Other reasons for companies outsourcing to India are:

- Labor Pool - graduating 75,000 English speaking IT professionals annually
- Cost advantage - US - \$2500 a month versus India - \$400
- Time difference - 10 hour time difference allows 24-hour service
- Higher Quality - 30% of the programmers in major US companies such as Microsoft are Indian
- Government Support - India has a National Minister of IT
- Thus because of its labor pool, lower cost, friendly government policies, infrastructure investment, and expertise, India is on a fast track to become a developed country. Given the economy, to become a truly "global Wal-Mart of services" (NASSCOM, 2005).

SUMMARY AND CONCLUSION

The central element of globalization is that it is driven by companies in their persistent search for market share and profits. Profits are lifeline for every company and U.S. corporations have gained \$8 billion in the past few years because of outsourcing just to India (NASSCOM, 2003). This would be reinvested in the business, and this will boost the over all economy. According to a

report by NASSCOM (2005), for every \$100 of call-center work offshore by U.S. firms, \$143 is reinvested back into the U.S. economy in the form of repatriated profits, increased sales of telecom equipment and cost savings. Similarly, in the case of IT services off shoring, for every \$100 of work off shored, \$133 is invested back into U.S. and \$142 is invested back in case of high-end knowledge services like equity research, underwriting, tax-preparation and risk management. The National Association of Software and Service Companies said that the U.S. economy could lose up to \$2 trillion worth of growth opportunities due to a massive labor shortage by 2010. This gap could be bridged through immigration of 3.2 million workers and off shoring to the tune of 1.3 million jobs.

Companies are at the heart of globalization and every business is a global business. In their quest for competitive advantage, companies seek to exploit their potential for their advantage and death of distance is bound to happen. Organizations now look beyond national frontiers and outsource its non-core activities to leverage value for customer. The future vision of any organization is simple: two worldwide companies - one focused on core business, and the other delivering the non-core services from offshore location that support the strategic vision.

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AN ANALYSIS OF WORLD-WIDE BUSINESS SCHOOL RESEARCH PRODUCTIVITY IN PRODUCTION AND OPERATIONS MANAGEMENT

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ABSTRACT

Most academic disciplines within business schools have authoritatively and reasonably analyzed and ranked their own research productivity in terms of authors and institutions. Disciplines such as finance (eg, Alexander & Mabry, 1994; Heck, Cooley, & Hubbard, 1986; Kaufman, 1984), accounting (eg, Andrews & McKenzie, 1978; Glover, Prawitt, & Wood, 2006; Zivney, Bertin, & Gavin, 1995), management (eg, Stahl, Leap, & Wei, 1988) and management information systems (eg, Claver, González, & Llopis, 2000; Grover, Segars, & Simon, 1992; Shim, English, & Yoon, 1993) publish such studies on a rather routine basis. Research in productivity rankings for business schools in whole has also been longitudinally conducted (Henry & Burch, 1974; Moore & Taylor, 1980; Niemi, 1988; Trieschmann, Dennis, Northcraft, & Niemi, 2000; Williams, 1987). In contrast, little such research has been conducted regarding the production and operations management discipline; only three such articles were located in a review of the relevant literature (Agrawal, 2002; Malhotra & Grover, 1996; Young, Baird, & Pullman, 1996).

In order to assess similar questions within the POM discipline, a large database (ie, greater than 4,600 entries) of POM article citations was compiled. The citations approximately and fully span the years 1991 through 2006 for the top five POM journals, in terms of both relevance and quality, selected upon the work of Barman, Hanna and LaForge (2001): *Journal of Operations Management*, *Production and Operations Management*, *Decision Sciences*, *International Journal of Production Research* and *International Journal of Production & Operations Management*. For the purposes of this study, those articles within *Decision Sciences* that were deemed not to directly pertain to the POM discipline were excluded from the analysis.

The preliminary results (based upon first authorship only, number of articles, without regard to number of pages) find that institutional productivity in POM is higher in certain second-tier American universities, whereas it is noticeably absent from most American top--tier institutions. This finding generally concurs with Young, Baird and Pullman's work, while it generally discounts Malhotra and Kher's work. More significant is the finding that a large percentage of institutions with the highest levels of productivity in POM research are outside the United States. This finding heavily discounts the findings of Malhotra and Kher; the other two studies were intentionally constrained to U.S. institutions. This latter finding, upon further analysis, may be attributed to a trend toward globalization of research efforts in the POM discipline.

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COMPUTATIONAL PROTEIN SEQUENCES ANALYSIS FOR DIABETIC RETINOPATHY – A BIO INFORMATICS STUDY

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ABSTRACT

The role of bioinformatics is to aid life scientists in gathering and processing genomic data to study protein function. Another important role is to aid researchers at pharmaceutical companies in making detailed studies of protein structures to facilitate drug design. Human genome with 3 billion chemical nucleotide bases has about 30,000 genes whose functions are known to a great extent. These genes dictate the synthesis of different proteins which proteins differ from one another in their amino acid sequence. The physiological functions of a protein depend upon this sequence. The functions of the protein, butyrylcholinesterase, are not known to a great extent. Therefore its amino acid sequence is compared with the sequences of 29 different proteins using computational techniques. Close similarity is observed with the protein EST2_human which confirms similarities of physiological actions. This finding obtained from computational techniques, now found to be indispensable, help the scientists of life sciences to proceed with the work in their wet laboratories. Amino acid sequence of BChE is compared with proteins which act as inhibitors of neovascularisation and similarity is found with one of the inhibitors. Early onset of diabetic retinopathy is often found in patients who have insufficient BChE in their serum. This suggests that BChE may act as an inhibitor of neovascularisation that causes retinopathy.

INTRODUCTION

The role of bioinformatics is to aid life scientists in gathering and processing genomic data to study protein function. Another important role is to aid researchers at pharmaceutical companies in making detailed studies of protein structures to facilitate drug design. As to knowledge in life sciences, IT experts will be able to recall some of the rudiments they learned in secondary education. Since understanding the human cell is a primary concern in medicine, one usually wishes to infer human cell behavior from that of other species. The contents here, aim to shed some light on the questions. Anesthetists enquire about the caste of the patient before using the drug succinylcholine and this drug is not administered if he belongs to vysya caste. The reason for this can be understood from the following facts related butyrylcholinesterase.

Butyrylcholinesterase is an enzyme present in the plasma and other body fluids of animals [1]. BChE preferentially acts on butyrylcholine but it also hydrolyses acetylcholine[2,3]. Its real substrates are still unknown. It can hydrolyse hydrophobic and hydrophilic carboxylic or phosphoric acid ester containing compounds. It can be considered as an endogenous scavenger of anti cholinesterase compounds. SuCh is a neuromuscular blocking drug used for endotracheal intubation during operation, endoscopies and electroconvulsive therapy. It is hydrolyzed by BChE to succinylmonocholine and choline. Whereas the diester is a powerful muscle relaxant, monoester is not. When SuCh is injected intravenously, about 90% of its dose is hydrolyzed by BChE within

1 min and rest amount reaches the nerve-muscle junctions and binds to a receptor. In result, the nerve-end plate is depolarized and losses sensitivity to acetylcholine. SuCh administration to individuals carrying no or reduced BChE activity variants results in prolonged apnea, since a large overdose reaches to the nerve-muscle junctions. In order to avoid from this result, the assay of serum BChE activity is used in the assessment of patients with prolonged apnea after administration of SuCh during anesthesia. If prolonged apnea occurs, well-timed intravenous administration of highly purified human serum BChE decreases the duration of the induced apnea [4].

METHODS AND MATERIALS OF THE STUDY

We collected 29 known genes that are believed to be involved in the pathogenesis of bche. The functional protein sequences in FASTA for these genes are collected from NCBI (National Center for Biotechnology information, ref:<http://www.ncbi.nlm.nih.gov/>). These sequences are given to ClustalW(ref: <http://www.ebi.ac.uk/clustalw/>) for the Multiple Sequences Alignment(It calculates the best match for the selected sequences, and lines them up so that the identities, similarities and differences can be seen). Based on these results, the Scores Table are derived.

RESULTS BY COMPUTATIONAL TECHNIQUES AND DISCUSSION

Amino acid sequences of different proteins can be obtained from Protein data banks, SWISS-PROT, ebi etc. BChE has 602 amino acids. This sequence is compared with 29 proteins with important physiological functions and the results obtained are given below.

SNo	Seq Name	Len(aa)	Score
1	Q96HL2_HUMAN	64	100
2	TTHY_HUMAN	147	12
3	ALAT_HUMAN	495	6
4	EST2_HUMAN	559	34
5	CEL_HUMAN	742	27
6	DOPO_HUMAN	603	6
7	A4_HUMAN	1098	6
8	CLAT_HUMAN	420	4
9	IAPP_HUMAN	89	19
10	Q53Y25_HUMAN	465	2
11	Q6LCT9_HUMAN	87	5
12	AAKB1_HUMAN	269	6
13	AAMP_HUMAN	434	8
14	AATC_HUMAN	412	10
15	2B31_HUMAN	266	4
16	3BHS2_HUMAN	371	7

SNo	Seq Name	Len(aa)	Score
17	3HAO_HUMAN	286	10
18	5HT1A_HUMAN	422	6
19	5HT1E_HUMAN	365	4
20	5HT1F_HUMAN	366	11
21	5HT2B_HUMAN	481	4
22	1433F_HUMAN	245	6
23	1433T_HUMAN	245	7
24	1433Z_HUMAN	245	6
25	P78450_HUMAN	20	25
26	PLMN_HUMAN	810	4
27	Q96P36_HUMAN	288	12
28	Q9UHJ5_HUMAN	349	10
29	TSP1_HUMAN	1170	8

The detailed comparison of the two proteins, BChE and EST2_human obtained by the tools of BLASTA and FASTA is given below.

COMPARISON WITH EST2_HUMAN

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=====
SeqA Name      Len(aa)      SeqB Name      Len(aa)      Score
=====
CHLE_HUMAN     602          EST2_HUMAN     559          34
=====
MHSKVTTICIRELFWELLICMLIGKSHTEDDIIIAIKNGKVRGMNLIVFGG—TVTAFILG 58
MRLHRLRARI SAVA OGLLLLLLVRGGQDGSASPIRTTHIGQVIGSLVHVKGANAGVQITFLG 60
* : : : : *** : : * : : . . * : : * : * : : * : * . * : ***

IPYAQPPLGRIRLRFKFKQSLTKWSDIWNATKYANSCOONIDQSFPGFHG—SEMWNPTDILS 117
IPFAKPPILGFLRFAPFEPPESSVGGVVDGTTHPAMCIQDLTAVESEFISQFNHTFPSDSMS 120
** : : *** ** * : . . ** : : * : . . * : : . . * : . . * : * . : **

EDCLYLNWVWIPAPKPK—NATVLIWIYGGGFQTGTSSLHVYDGKFLARVERVIVVSMNYR 175
EDCLYLSIYTPAHSHEGSNLPVWVWIHGGALVFGMAS—LYDGSMLAALENVVVVITQYR 178
***** : : ** . : * : : : * : : * : * : * : : * : * : * : * : * : * : * : *

VGAIGFLALPGNPEAFGNMGLFDQQLALQVVKNTAAFGGNPKSVTLFGESAGAAASVSLH 235
IGVLGFFST—GDKHATGNWGYLDQVAALRWVQONLAFHGGNPDRTVTFGESAGGTSVSSL 237
: * : *** : : * : . * : * * : * : * : * : * : * : * : * : * : * : * : * : * : *

ILSPGSHSLFTRAILQSGSFNAPWAVTSLYEARNRILNLAKLTGCSKENETEIIKCLRNK 295
VVSPTISQGLFHGAINESGVALIPGLIASSADVIS—TVVANLSACDQVDSEALVGLRIGK 295
: : * : * : * : * : * : * : * : * : * : * : * : * : * : * : * : * : * : * : * : * : *
DPOETLLNEAFWVPGYPIPSVNFQPTVDGDFLDMEDILLELGGFKKQIILVGVNKDEGT 355
SKEETLA———INKPFKMIIPG—VVDGVFLPRHFQELLASADFOVVPSTVGVNNNEFG 347
. : *** . . : : * : * * : * : * : * : * : * : * : * : * : * : * : *

AFLVYGAPGFSKDNNSIITRKEFOEGLKIFFFGVSEFGKESILFHYIDWDDQRPENYRE 415
WLIPKVMR—TYDTQKEMDREASQAALQKMLTLLMLPITFGDLLREEYIGDNGDFQITLQA 405
: : . . : : * : : * : * : : : . . : : * : : * : : :

ALGDVVGDNFTICPALEFTKKESEWGNNAFFYYFEHRSSKLP—WPEVWGVMBGYETEFV 473
QFQEMMADSMFVIPALQVAHFQCSRAP—VYFYEQHQPSWLKNIRPPHMKADHGDELFPV 464
: : : : * : * : * : : : . . . . ** * : : * * * : * . * : * : * : *

FGLPLE—RRDNYTKAEETLSRSIVKRWANFAKYGNFNETQNNSTS WPFVKSTEQKYLTLN 532
FRSFFGGNYIKFTEEBQLSRKMKYWANFARNGNPN—GEGLPWPLED—QEEQYLQLN 521
* : . : : : * : * * : * : * : * : * : * : * : * : * : * : * : * : * : * : *

TESTRINTKLR AQCRFWTSFFPKVLEHTGNIDEAEWEVKAGFHRWNNYHMDWKNQFNDY 592
IQP—AVGRALKAHRIQFVKKALPQKIQELPEERHIEL——— 559
: : : * : : : * : : : * : : : * : : : * : : *

TSKKESC VGL 602
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Among the proteins whose amino acid sequences are compared with the protein sequence of BChE, EST2-Human has high similarity. Its functions also are similar to the function of BChE. While BChE hydrolyses succinylcholine, cocaine, and heroin this EST2-human enzyme catalyses the hydrolysis of heroin and morphine. Such amino acid sequence similarity studies help to find the physiological functions of any protein whose functions are not yet understood completely. Retinopathy is due to over growth of blood vessels and this neovascularisation [5] is accelerated by some factors. Neovascularisation stimulants and inhibitors are also given. These Inhibitors are [5] Thrombospondin-1, Platelet factor-4, 16K fragment of prolactin, and Angiostatin.

This suggests that early onset of retinopathy may be due to insufficient BChE in blood serum. It is known that people with insufficient BChE are not administered with the muscle relaxant, succinylcholine. Those people have an early onset of retinopathy. People with sufficient BChE do not have such early onset. Therefore it is proposed that BChE may act as an Inhibitor in neovascularisation. This BChE amino acid sequence is compared with these inhibitors to find out similarity in their sequence. Similarity is found with Platelet-derived growth factor 2 [Fragment] which is an inhibitor. Therefore BChE may help in inhibition of neovascularisation. In neovascularisation, new vessels sprout from the existing vessels. BChE has a role in Alzheimer's disease. Therefore, its amino acid sequence is compared with that of Alzheimer disease related protein, Amyloid beta (A4) protein [Precursor]. Though the protein A4 has 1098 amino acids in the sequence while BChE has 602 amino acids in its sequence there is some significant similarity in certain regions of the sequence. BChE is compared with the protein Islet amyloid polypeptide [Precursor] which selectively inhibits insulin-stimulated glucose utilization and glycogen deposition in the muscle. The alignment is scattered which suggests that BChE may not have similar functions. When BChE is compared with the protein Bile-salt-activated lipase [Precursor], with 742 amino acids high similarity is observed. This suggests that BChE may have some functional similarity with this protein. In that case absence of BChE may cause accumulation of fat.

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INFORMATION TECHNOLOGY LEADERSHIP PERCEPTIONS AND EMPLOYEE-CENTRIC ORGANIZATIONAL CULTURES

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ABSTRACT

Ineffective or inappropriate information technology (IT) leadership can result in incalculable losses through reduced IT team productivity and substandard organizational output. The problem addressed in this study is whether there are differences in CIO perceptions of their leadership in companies identified by Fortune magazine as a 100 "Best Places to Work" (BPW) and those CIOs in companies which have not earned the BPW distinction. This mixed quantitative and qualitative study will investigate the ways CIOs differ as revealed on a personal assessment of the way they perceive their leadership. A self-administered survey will be the data collection tool for this research design. Differences in leadership perceptions revealed in the survey results will assess whether differences exist between the two groups of leaders based on demographics, professional attributes, perceived behaviors, and attitudes. Logistic regression will be used to analyze the four variables under study, and each will also be examined individually, using either chi-square tests of independence or independent t tests. Several potential areas for social change could result from this research. Government agencies and private sector businesses might realize increased efficiency in their IT efforts if leadership practices of CIOs more closely reflected those in BPW organizations. This is a work in progress study as part of Doctoral Degree.

PROBLEM STATEMENT

It is unknown if a difference exists between the leadership perceptions of CIOs in Fortune magazine's "100 Best Places to Work" (BPW) companies and those CIOs in other companies. The objective of this research, then, will be to determine whether there are differences in the way CIOs perceive leadership characteristics in BPW firms and those who work in firms not in that category. Identifying differences in how the leaders perceive these characteristics might result in creating a new model for increasing IT leadership effectiveness. The results of the study might also clarify issues of critical internal concern to organizations and their perceptions of the value of IT leadership to organizational success. The findings could also suggest broader issues of concern related to these perceptions and values and how IT leadership affects the global competitiveness of the organization. The CIO leadership characteristics which are important to CIOs working for BPW organizations will be analyzed. In addition, the research will consider the multiple dynamics identified as factors relevant to CIO leadership style. Although research suggests an increasing awareness of the dynamics of leadership as more significant in determining organization-wide IT effectiveness than other qualities, it does not address perceptions held by IT leaders and the perceived value of effective IT leadership to organizational success. Karahanna and Watson (2006), Johnson and Lederer (2005), and Polansky (2002) agreed that the understanding by IT leaders about the developing prominence of the IT leadership role had relevance.

The impact of poor leadership on IT work is unmistakable, and the negative effects are growing. Research suggests there is a lack of assessment regarding systemic leadership issues.

Employee surveys and exit interviews also indicate that the residual impact of failed relationships between employees and organizational leadership is a primary cause of poor performance, work dissatisfaction, absenteeism, and employee turnover (Brigham, 2004). These factors marginalize the productivity, quality, and output of an IT organization (Management Services, 2001). Given these dynamics, high employee turnover and low employee morale are likely to continue in the IT field (Britnell, 2004; Melymuka, 2005; Himmelsbach, 2005). According to the 2004 Meta Group IT Staffing and Compensation Guide, 24% of the more than 650 companies surveyed indicated that IT professionals were extremely difficult to retain (Melymuka, 2005). While the research provides sufficient evidence to verify the assertion by Conry-Murray and Lasusa (2006) that a satisfied and energized IT team is important to the productivity of most successful organizations, how leaders might create a positive environment is less apparent. Evaluating and understanding the perceptions of IT leadership, particularly those IT leaders working for employee-centric organizations, may contribute to a framework for reducing the prevalence of ineffective IT leadership. This, in turn, may help to resolve numerous deleterious effects on organizational success and IT team performance. The research determinants may also prove useful to other IT leaders and learning institutions affected by the rapidly changing dynamics influencing 21st century IT leadership.

NATURE OF STUDY

This research will be focused on the IT leadership perceptions of CIOs working for employee-centric organizations recognized by Fortune magazine as 100 Best Places to Work (BPW) in 2006, compared with CIOs working for organizations in the IT industry that do not have that distinction (hereinafter referred to as the general population). The primary basis for the research methodology is the Katz (2004) study of over 300 CIOs working for educational institutions. This proposed study will employ a survey which will yield data appropriate for the research design. That design will include comparative analyses of two subsets of the CIO population, a research design that is particularly useful in situations when experimental designs are not possible (Barry, 2006). The research design has a comparison group that remains intact. The two populations are CIOs in BPW employee-centric organizations and CIOs in the general population. The researcher will employ a multifaceted research methodology to collect data that is primarily quantitative, but it will include a design element to accept limited qualitative input (Creswell, 1998). The researcher will examine CIO perceptions of leadership and analyze what differences, if any, are significantly specific to the two populations. Results may provide the basis for future research that uses defined competencies to gauge effectiveness of leadership behaviors (Hoffman & Thibodeau, 2005).

The proposed research will use a new data collection instrument, the "IT Leadership Questionnaire" (ITLQ), which will enable collection of responses about IT leadership in four categories: attitudinal, behavioral, demographic, and professional. It is composed of adaptations from the Katz study and includes components of the "Multifactor Leadership Questionnaire" (MLQ) that originated with Bass and Avolio (2002). The resource facilitating this process for the researcher is the online survey clearinghouse, Zoomerang, that enables users to create surveys and questionnaires for distribution to survey respondents. The Zoomerang Web site is in compliance with United States Department of Commerce policy for the collection, use, and retention of data (Safe Harbor directive for data protection) to ensure integrity of the data collection (United States Department of Commerce News, 2006).

SUMMARY

Fifty years ago, IT changed the world, and the world of the 21st century is changing IT. At the center of this shift is the individual responsible for leading the changes in organizations: the CIO. Interrelated societal dynamics affect the demands on the IT function of organizations and the leader

responsible for that function. The change in the relationship between IT effectiveness and the CIO is emerging with clarity. Evidence of ineffective IT leadership and resultant adverse effect on every element of a business illustrates the influence of the CIO leadership, perceptions of such leadership on the output of the IT function, and employee morale and retention. CIOs that resist adaptation to the changes of 21st century IT may find it difficult or impossible to achieve organizational success in the changing environment. This is a work in progress study as part of Doctoral Degree.

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IMAGE COMPRESSION AND FEATURE EXTRACTION WITH NEURAL NETWORK

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ABSTRACT

The need to transmit data over Internet is increasing at a very fast pace, which requires techniques that can considerably reduce the size of images so that they occupy less space and bandwidth for transmission. In this paper, we have used Kohonen's self organizing map (SOM) network, which is a class of neural networks, for image compression and feature extraction. Moreover, a global processing technique is used for training the Kohonen's network that can considerably, reduce the size of images. JPEG images were used for the experimentation.

1. INTRODUCTION

Following the rapid development of information and communication technologies, more and more information has to be processed, stored, and transmitted in high speed over networks. The need for data compression and transmission is increasingly becoming a significant topic in all areas of computing and communications. Computing techniques that would considerably reduce the image size that occupies less space and bandwidth for transmission over networks form an active research. Image compression deals with reducing the amount of data required to represent a digital image (Haykin, 2003).

Several compression techniques have been developed, such as Differential Pulse Code Modulation, Discrete Cosine Transform (Gersho and Gray, 1992), Discrete Fourier Transform, and numerous vector quantization (VQ) methods (Amerijckx et. al., 2003). VQ technique has been used widely (Gray, 1984; Gersho and Gray, 1992). VQ has fairly good performance in both compression ratio and extracted image quality. The principle of the VQ technique is simple. At first, the image is split into square blocks of $n \times n$ pixels, for example 4×4 , 6×6 or 8×8 ; each block is a vector. After dividing the original image into blocks, the VQ encoder is used to search each block throughout the codebook for the codeword that is similar to the image block. The index values of the code words closest to the blocks are recoded as the compressed image. When decompressing the image, the VQ decoder uses these index values to recover the corresponding blocks to reconstruct the image. Although, VQ is a powerful technique, it however suffers from high computational complexity.

Kohonen's self-organized map (SOM) is another image compression technique that achieves the same efficiency at that of the VQ scheme (Amerijckx et. al., 1998). SOM has many applications, including but not limited to, classification and exploration of collections of text documents, image compression and pattern recognition (Chen et al., 1994; Pei and Lo, 1988). Kurnaz et al. (2001) presented an incremental self-organized map for the segmentation of ultrasound images. Elements of the feature vectors were formed by the Fast Fourier Transform of image intensities in square blocks. Zheng (1994) described the concept of groupings based on certain rules such as proximity and similarity of image segmentation based on SOM. Katoh et al. (1998) used SOM for recognizing

human emotions through facial expressions. By inputting various images of facial expressions into SOM and changing the interconnection weights, they were able to classify image features.

In this paper, we present an image compression technique using SOM employing global processing. Global processing technique processes every pixel of an image without utilizing blocks as it is generally implemented in the conventional SOM. The proposed technique places emphasis on the fourth property of the feature map e.g. feature extraction. In this respect, the data from an input space obtained from nonlinear distribution, is processed using the SOM to select the set of best approximating features.

2. KOHONEN'S SELF ORGANIZING MAPS

Kohonen invented the self organizing map (SOM) in the early 1980s. Kohonen's SOM is a widely-used artificial neural network (ANN) model based on the idea of self-organized or unsupervised learning (Kohonen, 2001). The SOM network is a data visualization technique, which reduces the dimensions of data through a variation of neural computing networks. It is a nonparametric approach that makes no assumptions about the underlying population distribution and is independent of prior information (Kohonen, 2001). The problem that data visualization attempts to solve is that humans simply cannot visualize high dimensional data so techniques must be created to help us understand high dimensional data.

In SOM, the neurons are placed at the nodes of a lattice e.g. usually one or two dimensional. The neurons become selectively tuned to various input patterns (Stimuli) or classes of update patterns in the course of a competitive learning process. The location of the neurons so tuned (i.e. winning neurons) become ordered with respect to each other in such a way that a meaningful coordinate system for different input features is created over the lattice. A SOM is therefore characterized by formation of a topographic map of the input pattern in which the spatial location of the neurons in the lattice is indicative of intrinsic statistical features contained in the input pattern (Haykin, 2003; Zheng, 1994).

SOMs are based on competitive learning in which the output neurons of the network compete among themselves to be activated or fired, with the result that only one output neuron, or one neuron per group, is on at any one time. An output neuron that wins the competition is called a winning neuron (Haykin, 2003). One way of inducing a winning neuron is to use lateral inhibitory connections (i.e., negative feedback paths) between them. SOM provides a way of representing multidimensional data in much lower dimensional spaces - usually one or two dimensions. The brain is organized in such a way that topologically ordered computational maps (defined by an array of neurons representing slightly differently tuned processors or filters) represent different sensory inputs. Consequently, the neurons transform input signals into a place-coded probability distribution that represents the computed values of parameters by sites of maximum relative activity within the map (Knudsen, 1987).

3. METHODOLOGY

As mentioned earlier, the Kohonen's SOM is based on an unsupervised learning that only requires the input data with the main objective of reducing high dimensional input space to lower dimensional output. In addition to these important characteristics, the algorithm is simple and easy to understand. In this paper, we use SOM for segmenting images. Image processing using segmentation is treated as a classification problem, in which segmentation is achieved by pixel classification using SOM (Kong and Guan, 1994). Kong et al. (2002) used SOM for performing image segmentation in two steps, coarse segmentation to obtain the global clustering information of the image followed by pixel based classification scheme that utilizes the local features to refine segmentation. Iivarinen et al. (1996) used SOM to estimate the distribution of features extracted

from faulty-free samples. Visa (1992) implemented image segmentation based on SOM and texture measures. The proposed SOM algorithm for image compression using SOM employing global processing is divided into six steps as depicted in the chart below.

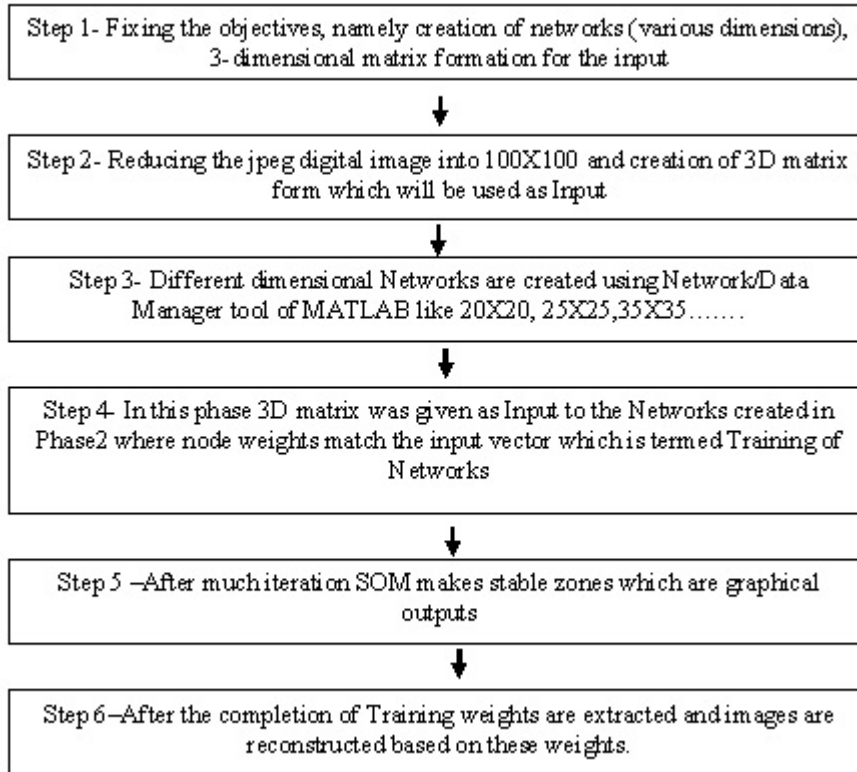


Figure 1: Flowchart of the methodology

4. EXPERIMENTS

The above six-step methodology is applied to an image compression problem. First, we acquired a digital image from the Internet (Stallman, 2001). This image was in jpeg format. The size of the image was reduced from its original size of 2835X2050 pixels to 100X100 pixels. Initially, gray values of pixels were extracted in a matrix form. Subsequently, a three-dimensional matrix was formed in which two dimensions were concerning pixel coordinates and the third dimension was the gray level of every pixel of image. This three-dimensional matrix formed the input to the networks, created for experimentation.

Networks were created to compress the image while retaining its key features. Experiments were done with the help of Network/Data manager tool of the MATLAB software. Every network created was uniquely identified by its name. The networks created were Self-Organizing Maps having dimensions as 15x15, 20x20, 25x25, 35x35 and finally 45x45 dimensional map varied from 225 neurons to 2025 neurons. The topology adopted was a grid topology. The distance function selected was 'LINKDIST'. The ordering phase learning rate was fixed at 0.9 and the steps for this phase were kept at 2000. Similarly tuning phase learning rate was kept at 0.02. The neighborhood distance was fixed to unity.

After the creation of the network, a three-dimensional matrix (as described above) was given input into the network. Where the node weights match the input vector, that area of the lattice was

selectively optimized to more closely resemble the data for the classification of the input vector. From an initial distribution of random weights, and over much iteration, the SOM eventually settle into a map of stable zones, where each zone was effectively a feature classifier, so you can think of the graphical output as a type of feature map of the input space. Self-organizing feature maps (SOFM) learn to classify input vectors according to how they are grouped in the input space. They differ from competitive layers in that neighboring neurons in the self-organizing map learn to recognize neighboring sections of the input space. As a result, self-organizing maps learn both the distribution (as do competitive layers) and topology of the input vectors they are trained. After the completion of training, weights were extracted from the network object, obtained as a result of training.

5. RESULTS

Based on these weights, reconstruction of the image was performed and the results were found to be satisfactory. We noticed that as we increase the dimensions of the SOM, the images begin to resemble more closely the original image. Also, more feature extraction took place as we increased the dimensions of the map. Since SOM is computationally intensive a substantial amount of time is expended in mere training of any SOM network.

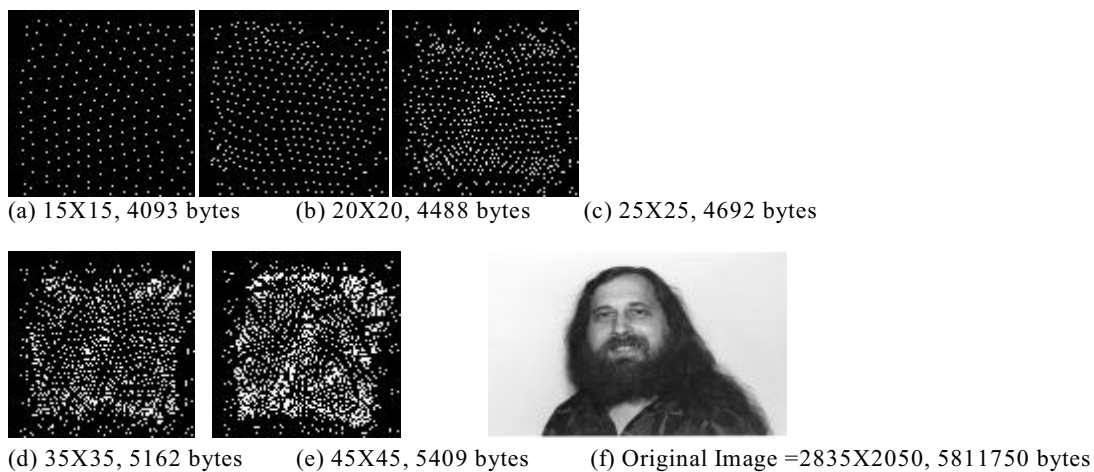


Figure 2: Reconstruction of Images

6. CONCLUSION

In this study, we used SOM for segmenting images. The unsupervised learning paradigm implemented using SOM has been one of the major methods for image segmentation research. Image compression addresses the problem of reducing the amount of data required to represent a digital image. Digital Image Processing encompasses processes whose inputs and outputs are images and encompasses processes that extract attributes from images, up to, and including the recognition of individual objects. A global processing technique was used for the image compression and the image taken was in jpeg format. As we increased the dimensions, the picture was reduced by the number of bytes and started to closely resemble the actual picture through the feature extraction property of SOM thereby making the images very convenient for storage and transmission.

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QUADRATIC ASSIGNMENT MODEL WITH MULTIPLE GOALS FOR THE DESIGN OF HUMAN-COMPUTER INTERACTION

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ABSTRACT

This paper presents an alternate approach, which handles multiple qualitative and quantitative factors in a different manner separately in the objective function to obtain the initial layouts. The results of the proposed approach are compared with that of an existing approach which handles a number of qualitative and quantitative factors in the same manner as in the objective function to obtain the initial layouts for the example task of the user interface components layout problem under consideration.

1. INTRODUCTION

The multi-criteria facilities layout model handles a number of criteria values associated in the multiple qualitative and quantitative factors with the objective function of the quadratic assignment problem (QAP). Koopmans and Bockman (1957) introduced the QAP to locate the interacting plants of equal areas. The QAP may be solved by either construction or improvement procedures to obtain the layouts. The QAP has been applied to a wide range of applications, which includes the urban planning, control panel layout, and wiring diagram (Bazaraa, 1975), among others. McCormick et al. (1982) used these techniques and tools in the layout of design controls and displays. Fortunately, there is much literature reporting research and experience from design projects with automobiles, aircraft, typewriters, home appliances, and so on that can be applied to the design of interactive computer systems (Shneiderman, 2000). A dominant goal of human-computer interaction (HCI) is to design simplistic interfaces that enable users to quickly perform tasks with the implicit assumption that it would refine their skills through experience (Bhavnani, 2000). User interface design involves the graphical layouts of menus/icons.

Little experimental research has been done on menu/icon layout (Shneiderman, 2000). Layouts in which related items (or components) were clustered increase accuracy by reducing the scanning needed to locate distant items (Vincow and Wickens, 1993). Sears (1993) developed a task layout metric called layout appropriateness, which is widget level metric that deals with buttons, boxes, and lists. It is used to assess whether the spatial layout is in harmony with the user's tasks. Earlier, the menu/icon items were sequenced in functional groups alphabetically and randomly. Card (1989) observed the poor performance with the random sequence and confirms the importance of considering alternative presentation sequences for the items. The basic framework for the design of the user interface that includes the layout of its components is provided in HCI cognitive modeling (Card et al., 1983). Cognitive models of knowledge and performance abounded, taking the form of task grammars, production rules, and procedural models such as GOMS (Goals, Operators, Methods and Selection Rules). Olson and Olson (1990) outlined several significant gaps in cognitive theory that prevent cognitive modeling in general from addressing some important aspects of HCI. Several

studies have shown GOMS to be a powerful and accurate method of analysis for human performance (Bovair et al., 1990). Later, GOMS was expanded to model tasks with low level perceptual, cognitive, and motor operations (John, 1990). This opens up the possibility of using GOMS to compare different layouts on key stroking or mouse pointing, and textual and graphical layouts, etc. (Chuah et al., 1994). Interface representations include a node-and-link diagram and a square matrix of items (or components) with the value of a link attribute in the row and column representing a link (Shneiderman, 2000) for each factor. A square matrix represents a from-to chart of workflows in a manufacturing plant. Hence, there is one-to-one relationship between the facilities layout problem in a manufacturing plant and the user interface components layout problem in the human – computer interface. Hence, the QAP models and their procedures can effectively be used in layout design of user interface components.

In this paper, we present an alternate mathematical approach to the Harmonosky and Tothero (1992) approach, in which the multiple qualitative and quantitative factors are handled in the same manner in the objective function of the facilities layout problem. In the proposed approach, a mathematical model is developed to handle the multiple qualitative and quantitative factors in a different manner separately. Then, a construction procedure is proposed, in which the pair of facilities with least composite criterion value is selected to place far apart in the layout to obtain the initial layouts. The resulting initial layouts may be improved further by using the improvement procedures. The results of the proposed approach are compared with the Harmonosky and Tothero (1992) approach for the example task of the user interface components layout problem under consideration.

2. MULTI-CRITERIA FACILITIES LAYOUT MODELS

Many numbers of models are developed, which handle only two criteria values qualitative and quantitative in the objective function of the facilities layout problems (Khare et al., 1988; Rosenblatt, 1979; Dutta and Sahu, 1985; Rosenblatt, 1979; Fortenberry and Cox, 1985; Urban, 1989). Real life problems are involved with multiple numbers of factors, both qualitative and quantitative to be considered in the objective function of facilities layout problem. Harmonosky and Tothero (1992) proposed a model, which handles a number of qualitative and quantitative factors as in the same manner in the objective function of facilities layout problem. That is, the sum of weights assigned to all factors is unity. Further, the fraction of weight assigned to qualitative criterion is equally divided among all individual qualitative factors. Similarly, the fraction of weight assigned to quantitative criterion is equally divided among all individual quantitative factors.

Since the ranges of closeness relationship ratings of qualitative criteria and the interactions of quantitative criteria are different, the two approaches must be handled separately. The sum of weights assigned to all individual qualitative factors and all individual quantitative factors is unity. In real life, the various qualitative factors, such as familiarity, instruction type, interface type, fatigue, etc. are concerned with the novice, intermittent, and expert users which have different kinds of influence on the final layouts of the textual and graphical user interface components. Similarly, the various quantitative factors such as pace-of-interaction, interaction style, step-by-step work, and all-at-once work of the users will have different kinds of influence on the final layouts of the textual and graphical and user interface components. Hence, it is required to assign different weights to all individual qualitative and quantitative factors, so that the final layout reflects the relative importance of each factor.

Generally, the construction procedures are based on qualitative criteria. Harmonosky and Tothero (1992) employed the construction procedure which is based on composite criteria values to obtain the initial layouts. Based on this approach, the pair of facilities with maximum composite criterion value is selected for the center of the layout, and the subsequent facilities are selected based on the same criterion, which is to be placed near the existing facilities in the layout. The composite

criteria values are included with qualitative as well as quantitative criteria values. Therefore, we present a construction procedure in which the pair of facilities with the lowest composite criterion value is selected and placed far apart to obtain the initial layout for the improvement programs. Since the improvement programs are sensitive to the initial layouts (Harmonosky and Totho, 1992), the better final layouts are expected to be obtained from the initial layouts of the proposed construction procedure.

3. PROPOSED METHOD

The proposed method consists of a model and a construction procedure for the multi-criteria facilities layout problem that handles multiple qualitative and quantitative factors in a different manner separately in the objective function. The proposed quadratic assignment formulation for the facilities layout problem can be expressed as follows.

$$\text{Minimize } z = \sum_{i=1}^n \sum_{j=1}^n \sum_{k=1}^n \sum_{l=1}^n A_{ijkl} x_{ij} x_{kl} \tag{3.1}$$

$$\text{Subject to: } \sum_{i=1}^n x_{ij} = 1, \quad j = 1, 2, \dots, n \tag{3.2}$$

$$\sum_{j=1}^n x_{ij} = 1, \quad i = 1, 2, \dots, n \tag{3.3}$$

$$x_{ij} = 0 \text{ or } 1, \quad i, j \tag{3.4}$$

where, $x_{ij} = 1$, if facility i is assigned to location j
 0 , otherwise

In the proposed approach, the cost term (A_{ijkl}) and the composite factor (A_{ij}) are given in expressions (3.5) and (3.6).

$$A_{ijkl} = A_{ij} d_{jl} \tag{3.5}$$

$$A_{ij} = (W_1 R_{ij} + W_2 F_{ij}) \tag{3.6}$$

where, d_{jl} is distance between the locations j and l , and $W_1 + W_2 = 1$, $W_1, W_2 \geq 0$.

In the expression (3.6), the combined qualitative factor (R_{ij}) and quantitative factor (F_{ij}) are:

$$R_{ij} = \sum_{k=1}^u \beta_k R_{ijk}, \quad i, k \tag{3.7}$$

$$R_{ijk} = r_{ijk} / \sum_{i=1}^n \sum_{k=1}^n r_{ijk}, \quad P \tag{3.8}$$

$$F_{ij} = \sum_{q=1}^q \gamma_q F_{ijq}, \quad i, k \tag{3.9}$$

$$F_{ijq} = f_{ijq} / \sum_{i=1}^n \sum_{k=1}^n f_{ijq}, \quad q \tag{3.10}$$

where, $\sum_{k=1}^u \beta_k = 1$ u is the number of qualitative factors, r_{ijk} is the relationships value between facilities i and k for factor p , R_{ijk} is the normalized relationship value between facilities i and k for factor p ,

$\sum_{q=1}^w r_{pq} = 1$, w is the number of quantitative factors, f_{ikq} is the work flow value between facilities i and k for factor q , and F_{ikq} is the normalized work flow value between facilities i and k for factor q .

Once, the composite criteria values are computed then the problem is solved as a single factor problem by using either construction or improvement procedures (Harmonosky and Tothoro, 1992). Since the improvement programs are sensible to the starting layout, a construction procedure is proposed to generate a good starting layout for the improvement programs. The proposed construction heuristic is involved in selecting the pair of facilities with the lowest composite criterion value to place in the locations far apart in the layout, since the composite criteria values are included with the work-flow values along with the closeness relationship values. The proposed construction heuristic is used to generate an initial layout for the improvement procedure to improve the solution based on pair wise exchanges. Because the improvement programs are sensible to the initial layouts (Harmonosky and Tothoro, 1992), better results may be generated with the proposed construction procedure.

4. APPLICATION

In order to explain the application of the multi-factor facilities layout methodologies for the layout design of user interface components, a text edited in MS-WORD in John and Kieras (1996) is considered as an example task. The facilities layout models are used for the layout design of the textual and graphical user interface components (menus/icons). Hence, the example task is not included with the operations to type the missing characters. The text is considered as component 1 and it is required to be modified by deleting the strike-off characters, bringing the rounded phrase to the location indicated by an arrow, setting the text to have right justification, and spell checking as shown in the Figure 1 of the example task. In order to accomplish these tasks, the user interface components to be used are Del, Cut, Paste, Right and Spell check, which are numbered as components 2, 3, 4, 5 and 6 respectively. The delete operation is performed by selecting the Cut operator from the generated with right-click of the mouse. The rating system used for the qualitative relationships between the pairs of components is: A=5, E=4, I=3, O=2, U=1 and X=0. The quantitative factor is characterized as the interactions between the various pairs of components. The interaction between the pair of components is defined as the use of one component immediately after another component to perform an operation. The interactions are observed to be ranging from 1 to 4 for the task under consideration.

In order to understand GOMS models that have arisen in the last decade and the relationships between them, an analyst must understand each of the components of the model (goals, operators, methods, and selection rules), (the concept of level of detail), and the different computational forms that GOMS models take. In this section, we will define each of these concepts; in subsequent sections we will categorize existing GOMS models according to these concepts.

Figure 1: The example task: editing a marked-up manuscript

The qualitative closeness relationship rating values (r_{pq}) between the components i and k for factor p considering 3 factors, viz., familiarity, anxiety and fear of a user and the quantitative interaction values (f_{ikq}) between the components i and k for factor q , considering 3 factors viz., place-of-interaction, interaction style, and frequency-of-use of a user are evaluated in the computer

laboratory. The distances between the various pairs of locations j and l are also used to obtain the layouts with the proposed layout approach as well as the existing layout procedure. The comparisons of the results are given in the first row of the Table 1. The comparison of the results for the various sizes of problems is also given in the Table 1. Better results are obtained with the proposed model and a construction layout procedure compared to the existing model and a solution procedure. Hence, the resultant layouts of the textual and graphical user interface components are expected to increase human comfort and reduce the task performance time for all sorts of users.

Table 1: Summary of the Improvement of Results							
Problem Size	Closeness relationship ratings and flow	% Improvement					
		Existing layout procedure		Proposed Layout Procedure			
		Proposed model		H & T Model		Proposed Model	
		Construction	Improvement	Construction	Improvement	Construction	Improvement
6 - Components	A=5, E=4, I=3, O=2, U=1 and X=0 Interactions: 1 to 4	1.829	2.301	2.214	2.528	2.586	5.414
6 - Facilities	A=6, E=5, I=4, O=3, U=2 and X=1 Flow: 2 to 10	8.500	3.643	8.713	4.789	8.825	5.263
9 - Facilities	A=6, E=5, I=4, O=3, U=2 and X=1 Flow: 2 to 10	8.322	5.761	8.783	6.243	8.814	6.458
6 - Facilities	A=4, E=3, I=2, O=1, U=0 and X=-2 Flow: 2 to 10	7.871	9.186	7.952	9.507	8.022	9.721
9 - Facilities	A=4, E=3, I=2, O=1, U=0 and X=-2. Flow: 2 to 10	8.032	9.245	8.443	9.734	8.672	9.804

5. CONCLUSION

In this paper, we have presented an alternate approach to the Harmonosky and Tothoro (H&T) (1992) approach. In the proposed approach, an alternate mathematical model is developed for the multi-factor facilities layout problem, in which the multiple qualitative and quantitative factors are handled in a different manner separately in the objective function. A construction procedure is also developed to obtain the initial layouts for the multi-factor facilities layout problem, in which the pair of facilities with least composite criterion value is selected to place far apart in the layout. The results of the proposed model are compared with that of the H&T model with the help of an example task of textual and graphical user interface components. The results have been improved by using the proposed improvement procedure in comparison with the H & T construction procedure. Also, the results of the proposed model have been improved over the H & T model with the existing H & T construction procedure, which in turn have been improved with the improvement heuristic. The results of the proposed construction layout procedure have been compared with that of the H & T layout procedure. It is observed from the results that the solution of the proposed layout procedure has been improved over the existing construction layout procedure. Also, the results have been improved in improvement heuristic over the construction heuristic. It is found that better results have been obtained with the proposed model and the proposed layout procedure compared to the existing model and the layout procedure. Thus, the proposed model and the layout procedure, if used, would provide a better result for the user interface. The resultant layouts of user interface components are expected to increase human comfort and reduce task performance time for all sorts of users.

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DISTANCE LEARNER EXPECTATIONS FOR QUALITY, TECHNOLOGY-ENABLED, STUDENT SUPPORT SERVICES

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ABSTRACT

Distance learning has become a widely accepted option for delivering higher education. Quality in distance education includes, among other things, appropriately designed and delivered student support services. The purpose of this study was to investigate learner expectations for quality, technology-enabled support services in graduate-level programs at a distance-based university. An evaluative case study method was used as the research design. Survey, interview, and examination of historical documents were used as the data collection techniques. The survey followed the SERVQUAL model, a survey instrument employed in the commercial sector to test consumer expectations against service performance. Interviews were conducted with former students and other stakeholders in the service processes. Student evaluations from graduate-level courses were examined. The study revealed that expectations for quality, technology-enabled student support services were very high. Perceptions of service performance ranged from low to high.

PROBLEM STATEMENT

When distance learner expectations for quality, technology-enabled support services are not met, student dissatisfaction increases, which may lead to attrition. In order to fully understand the nature and magnitude of this problem, it is necessary to determine what distance learners expect from support service providers and evaluate to what extent the service performance of the institution matches those expectations. A study that assesses the gaps between distance learner expectations and perceptions could provide a greater understanding of the influence of expectations for support on perceptions about service performance.

PURPOSE OF STUDY

The purpose of this study was to investigate learner expectations for quality, technology-enabled support services in graduate-level degree-granting programs at a distance-based university. This was done in order to characterize the nature and magnitude of the problem at that school. This study was also intended to determine if students perceive gaps between expectation for service and actual service performance as a way to explain to what degree service quality exceeds, meets, or fails to meet student expectations. Age, gender, educational level, program affiliation, and time in program were explored in order to determine whether or not expectations for quality, technology-enabled support services differ based on any of those factors.

DESIGN OF THE STUDY

For this study, an evaluative case study method was used as the research design. The justification for selecting this approach was based on three goals designated for the purpose of the student.

The goal was intended to investigate learner expectations for quality, technology-enabled support services in graduate-level, degree-granting programs at one distance-based university in order to characterize the nature and magnitude of the problem at that school. Qualitative research is exploratory in nature and provides the researcher with greater insight into whether or not the supposed problem exists and warrants further study (Cooper & Schindler, 2003, Simon, 2006). A case study is “a type of qualitative research in which in-depth data are gathered relative to a single individual, program, or event, for the purpose of learning more about an unknown or poorly understood situation” (Leedy & Ormrod, 2005, p. 108). A case study is also a type of field research that is used to examine “a single social phenomenon or unit of analysis – for example, a particular community, organization, or small informal group” (Singleton & Straits, 1999, p. 321). An evaluative case study as the research method was appropriate because depth of understanding about the extent of the problem at this one institution was a desired outcome.

This study will assess the gaps between distance learner expectations and perceptions in order to provide a greater understanding of the influence of expectations for support on perceptions about service performance. Knowing this would allow institutional service providers to develop support delivery programs that meet learner expectations, increase student satisfaction, and manage attrition. In addition to framing the nature of the problem, this research will culminate in a set of recommendations to the target university on ways to close the gaps between service expectations and performance. With this information the service provider would be able to evaluate its method of delivering support and develop an action plan for change to improve the quality of support services.

Using multiple sources of data (a requirement of case study research), the researcher aggregates the data across data sources, by category (e.g., gender), to determine if patterns emerge from the cumulative results. For this study, survey, interview, and examination of historical documents were used as the data collection techniques. The sample participants were current students, former students, and other stakeholders in the service processes at the target university. Categorical aggregation was considered as a technique to analyze the demographic data collected from the student survey and interviews in order to gain a deeper understanding of the phenomenon and potentially identify the basis for any emergent patterns.

RESULTS AND CONCLUSIONS

The results of this study indicated that expectations for quality, technology-enabled student support services were very high among the survey participants. Differences in expectations based on gender, age group, program, and time in program were found. Service performance received high ratings in some areas and moderate to low ratings in others. When expectations and perceived performance ratings were compared, gaps in service quality were uncovered. Statistical analysis of the data revealed that there is a negative relationship between Expectations and Service Quality and that as student expectations (E) for service quality rises, overall service quality (SQ) ratings drop. Also, it was determined that that satisfaction with service is a function of the gaps between performance and expectation. An interview with a former student yielded no significant information for the study. Interviews with stakeholders of the service processes revealed that the University has knowledgeable, dedicated employees who need more defined and documented processes and greater technology support. Content analysis demonstrated that the education programs received mostly positive comments from students on course evaluations while the other three programs received

more neutral feedback. Although the reliability of the scale was very high, the construct validity of the instrument may be questionable based on the factor analysis.

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KNOWLEDGE SHARING AND CULTURAL DIVERSITY AMONG IT PEOPLE: IMPLICATIONS ON KNOWLEDGE MANAGEMENT INITIATIVES

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ABSTRACT

Knowledge sharing is a key ingredient of any knowledge management (KM) initiative, and the dynamics of knowledge sharing encountered in different cultural settings is expected to affect the outcomes of these initiatives. Specifically, this paper examines the interplay between cultural diversity and knowledge sharing in IT settings. It considers cultural factors as part of the context of knowledge sharing processes. The findings of this study support the claim that the cultural differences found in IT environments, as well as the complexity of the management processes, are not unique to IT settings. They also support the claim that cultural diversity does not have a negative impact on the abilities of IT people to share their knowledge, as they resort to using multimedia IT tools. However, in order to transform individual knowledge into collective knowledge and, consequently, have a larger impact on organizational effectiveness, a firm's management has to provide incentives for knowledge sharing.

INTRODUCTION

Despite high levels of spending, organizations struggle in their efforts at implementing knowledge management (KM) initiatives. Some of the reasons are that KM initiatives are very complex and suffer many competing objectives. For example, one of the main ingredients for successful KM initiatives is the organizational dynamics of knowledge sharing. Managers want their employees to share their knowledge but may not offer incentives to do so. In general, managers are struggling to find the appropriate balance between the hard aspects of KM (deployment the appropriate IT tools) and the soft aspects (transformation and capturing knowledge through the management of people).

In general, this research attempts to shed some light on some of the factors influencing the failure or the success of KM initiatives. Specifically, this paper discusses cultural issues in IT environments and the impact they have on knowledge sharing. Organizational culture has been reported to affect the success or failure of IT efforts in general, and knowledge management initiatives in particular (Watad, 2005; Mason, R, 2003; Story, 2001). According to the results of a recent study on managerial perceptions of IT-based initiatives (Mason, D. 2003), managers perceived culture as the single most important barrier to the success of these initiatives. Leadership and the lack of awareness came in second and third places respectively. Culture is broadly defined here as the set of ideas, values, customs, and language that are shared by a large group of people (Hofstede, 1980). Specifically, the study considers organizational culture as a set of basic assumptions embedded in the organization structure about what, how, and where to produce and deliver products or services (Ford & Chan, 2003). Since knowledge sharing is an important element of any KM initiative, the dynamics encountered in different cultural settings is expected to have serious implications on the outcomes KM initiatives. One of the long term implications of this study

would be to provide organizations with some insights on how to devise mechanisms to cultivate best practices in knowledge sharing among and within its various functional areas and environment.

RESEARCH METHODOLOGY

The study is based on a survey of managerial perceptions. There has been some controversy in the organization and IT literature regarding the usefulness of the application of perceptual versus objective measures. The perceptions of organization's members are important in the sense that, very often, perceived elements are used in making decisions. Most researchers and practitioners studying the impacts of IT on organizations apply self-assessment approaches where the same respondents evaluate the impacts.

The research approach was exploratory and attempted to provide insight into the relationships existing between cultural diversity and knowledge sharing in the context of KM initiatives. The research methodology is based on thirty interviews and follow-ups, with IT people with at least five years of experience, from organizations in the New York-New Jersey metropolitan area. The organizations and industries were varied: IT, finance, services, and pharmaceutical. The concentration of a multicultural work force in the New York-New Jersey area makes it appropriate for the exploration of this subject. The purpose was to explore how cultural differences seem to affect the sharing of IT-related knowledge by IT people.

CULTURAL DIVERSITY AND KNOWLEDGE SHARING:

The spread of IT and Internet applications has created a shortage in skilled labor in the IT industry. This shortage has created opportunities for under qualified people who were, often, at the right place at the right time. One of the unintended consequences of the shortage has been the increased cultural diversity of the workforce. Diversification of the workforce provides companies with access to different ideas, skills, and it enhances the companies' competitive edge (Elmuti, 2001). However, management has to provide mechanisms and adjust structural arrangement in order to reap the benefits that accompany diversified workforce.

In both global and organizational contexts, one of the principal responsibilities of the manager of a project team is to generate interpretations and solutions to problems through the exploration of diverse views and opinions. The broader the collective perspective of a project team is, the more likely the group will generate a wide variety of potential solutions to a problem. One may assume that, given that members of different cultures have different kinds of frames of reference, a team composed of members from different cultural backgrounds would be interested in knowing the way of solving problems and sharing knowledge in both their own and the host cultures. On the other hand, cultural diversity may impede the sharing of knowledge, as there is a lack of personal compatibility and common language.

Companies with a diverse, multicultural workforce tend to rely on workshops to develop knowledge management skills among people from different backgrounds. These training sessions may emphasize ways to shorten the amount of time it takes to solve problems and explore alternative courses of action. However, these sessions usually lack a very important component, which is focusing on building mechanisms for knowledge sharing. Without these mechanisms, the work of the team will not reach adequate levels of performance that have a substantial impact on the effectiveness of the organization.

In order both to take advantage of a diverse workforce, and to allow employees to perform at their full capacities, managers should promote a cultural environment that is responsive to the employees' specific cultural needs (Elmuti, 2001). Organizations need to put in place multicultural communications tools to overcome language and cultural barriers. In fact, the cultural trait of not

being outspoken, for example, can be remedied by a collaboration system that includes anonymous features, which are useful for idea generation and feedback.

KNOWLEDGE SHARING AND ORGANIZATIONAL EFFECTIVENESS

Effective management of a firm's knowledge assets is an essential factor to achieve a sustainable competitive advantage in today's market (Drucker, 2001). A firm's knowledge encompasses a mix of framed experience, values, contextual information and expert insight that makes possible the incorporation of new experiences and information (Davenport & Prusak, 1998). This same knowledge entails the domain-related skills needed to boost organizational effectiveness through innovation and the enablement of a flexible KM infrastructure (Watad, 2002). Knowledge sharing helps in organizational learning (Ford & Chan, 2003) and the development of domain-related skills (i.e., expertise), a pre-condition to organizational innovation.

Knowledge sharing, which involves the process of disseminating knowledge within the firm, is susceptible to the effects of cultural differences (Ford & Chan, 2003). Trust, common languages and beliefs are critical to effective knowledge sharing (Simonin, 1999). More specifically, knowledge sharing within heterogeneous cultural groups tends to be difficult, requiring more time and effort than in homogeneous cultural groups (Ford & Chan, 2003). Therefore, management should promote knowledge sharing along formal structures that exhibit a formal reward system and incentives. A commonly used practice entails moving from rewarding individuals to rewarding groups, or devising incentives that promote sharing at both the divisional and firm levels.

In this study all respondents agreed that the cultural differences they observed in their workforce were not unique to IT people or their industry. However, they stated that the nature of the IT profession does lessen the negative impacts that cultural differences may have on the level of knowledge sharing. In comparison to other professionals, the apparent problems associated with cultural differences have less impact on the performance of IT personnel. This is largely due to the availability of computing languages and IT tools that may replace the need for the use of natural languages to communicate. In addition, qualifications in the IT industry are more important than race in the process of hiring people (Melymuka, 2000). As an IT analyst, who worked for different types of managers and people, quoted: "I have never noticed a difference due to ethnicity or sex. The differences are rooted more in education and experience. They share so much more in common with technology that, I believe, other issues tend to become clouded."

This study found that the majority of the IT people usually look for new associations among existing ideas, or exploring novel realms. It is in this group where organizations can find a rich source of innovative ideas and processes, that is, new knowledge. The study found that nature of IT work made IT people learn to share their knowledge. The majority stated that sometimes sharing is almost a necessity. It seems because the fast changing pace of IT industry is most likely to make their skills obsolete. Also there is always pressure to complete project before users change demands. This study recommends that other parts of the organization should take a serious look at IT people practices relevant to knowledge sharing. They may find that some of these practices maybe useful to them.

However, in order to transform individual knowledge into collective knowledge and, consequently, have a larger impact on organizational effectiveness, a firm's management has to provide the necessary tools needed to build incentives for knowledge sharing. There are instances in which some people, regardless of their cultural background, may decide not to share their opinions and ideas because of fear of being wrong, or fear of being judged negatively by their fellow co-workers. It may also occur that some people are not sure, or even aware of what they know. Managers have to encourage their employees to share their opinions, as well as to adjust their managerial style so that they can overcome their own cultural barriers and biases.

As a manager with more than ten years of experience in the IT industry said: "It has been very hard over the past few years adjusting to managing multicultural IT people, especially when they are

located in different countries and in a different time zone”. Most IT personnel in South East Asia refuse to voice their opinions and this manager has to drag information out of them at meetings. She has learned that she needed to adjust to the nature of her multicultural work environment, and did so. She also learned that if she instant-messaged her subordinates in advance, before they meet with a client, she would get their opinions and questions and, then, she could bring them to the client’s attention. In doing so, she could get her subordinates to share their knowledge, frames of reference, and expertise, and, at the end, provide more innovative solutions to the problems they handled, thus enhancing organizational effectiveness. The study found that these practices in which some managers adjusting their managerial style to accommodate their subordinates’ cultural limitations and consequently reap higher levels of productivity are at best could be described as maverick efforts. Therefore, this study recommends that organizations should encourage these positive practices to reach all levels of the organization.

SUMMARY

This paper considers knowledge sharing a key ingredient for the success of any KM initiative. Also, the dynamics encountered in different cultural settings is expected to impact the outcomes of KM initiatives. This exploratory study found that IT people tend to share their knowledge. The study concludes that there appear to be patterns of behavior among IT people that are attributable to different cultural backgrounds, and that they impact their performance. The negative impact that these differences have on IT people are lessened by the use and availability of multimedia tools for knowledge sharing. Most importantly by being aware of these cultural differences, IT managers may help their employees to be more productive. An implication of the study is that organizations, when introducing KM initiatives, should have a look at the practices of knowledge sharing among IT people; they may find some of these practices to be useful for the entire organization.

Based on the findings of this study, one may recommend that organizations promote employees’ and managers’ awareness of cultural overlaps and differences, as a way of tapping into the advantages of a diverse workforce to boost knowledge sharing and, consequently, organizational effectiveness. Workshops to promote the identification of commonalities and differences are crucial to achieving this goal. The objective should be the broadening of perspectives and approaches that produce a competitive advantage through the effective management of diversity in the workforce.

Another implication of the findings is that cultural diversity needs to be managed effectively, if organizations are to expand and improve their levels of knowledge sharing. Cultural diversity is an asset if employees are provided with an encouraging environment in which they express their opinions and contrast their frames of reference. It is essential to promote the sharing of expertise developed under different cultural backgrounds and the broadening of perspectives that organizational members bring into their problem solving processes. The lack of environments sensitive to diversity may render cultural diversity a liability for organizations.

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KNOWLEDGE SHARING IN A HUMAN RESOURCE COMMUNITY OF PRACTICE

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ABSTRACT

This study's purpose and research questions were designed to develop insights into how professional members of a human resource community perceive their knowledge-sharing experiences. Grounded in the hermeneutical phenomenology of Heidegger and Gadamer, data from the interviews were analyzed resulting in the emergence of three major themes: openness as a knowledge-sharing enabler, a personal construct of trust, and a preferred oral tradition. An ontological model, centered on an oral tradition, was established. Central to the oral tradition was a practice of storytelling that enabled long-term group memory. However, for the individuals participating in this study, translating the oral tradition to an online environment proved difficult, indicating the need for additional research. For managers wishing to gain the advantages of knowledge workers, a practical model with the key elements of openness and trust is proposed.

PROBLEM STATEMENT

The problem addressed by this study is the apparent incomplete understanding, by scholars and management practitioners, of the nature of the knowledge-sharing experience and process. For knowledge management scholars, one factor that may exacerbate this problem is a failure to adequately pursue a research style that is “geared to the development of new theory and new insights that are useful to the practice of management” (Worrall, 2004, p. 6). Management practitioners could benefit from scholarly research that generates models based on the human perspective and experience. Research in information and knowledge management taking a more human focus has been suggested by Breu and Peppard (2001), Hirscheim and Klein (2000), Hirscheim (1984), Nodoushani (1999), Prasad and Prasad (2002), Tsoukas (2002) and Wilson (2002).

In a criticism of knowledge management practice, Elmholdt (2004) stated that “despite the resources invested, the policy of knowledge management has proved difficult to accomplish in practice” (p. 328). Also, Elmholdt’s study found that “the guiding metaphor of knowledge as an entity that can be owned and controlled implies a superficial understanding of the knowledge informing professional practice” (p. 338). Thomas, Kellogg, and Erickson (2001) viewed the current knowledge management paradigm as “overly tidy,” where “a number of new pieces [need to be added to the knowledge management] puzzle” (pp. 863-864). Knowledge management “must be approached by taking human and social factors into account” and knowledge communities may be the key to successful KM projects (p. 881). These examples of recent research and others (dePaula & Fischer, 2005; Gupta, Iver, & Aronson, 2000; Hildreth, Wright, & Kimble, 1999; McAdam & McCreedy, 1999) have indicated that the current understanding of the knowledge-sharing process is limited.

Wang (2005) identified “knowledge sharing [as] one of the most critical issues in KM processes” and noted that Chevron and Xerox saved an estimated \$650 and \$100 million, respectively, from their knowledge-sharing projects (p. 8). These results demonstrated the potential effect of having the proper understanding of how and why individuals share what they know. In addition, Wang recognized that “research address[ing] the ‘people issues’ in . . . knowledge sharing” is fairly limited

and could “certainly help guide practitioners in designing more effective knowledge management initiatives” (p. 9). In a similar study, Small (2005) indicated that more understanding is necessary with regard to the knowledge-sharing process when he stated, “Existing KM models provide minimum guidance and understanding into what is needed to get knowledge workers to adopt appropriate [knowledge system] behavior” (p. 6). These studies are indicators of the need to improve understanding of the knowledge-sharing experience.

DESIGN OF THE STUDY

This study provides a research example demonstrating the importance of maintaining consistency among ontology, epistemology, and methodology. An interpretative and humanistic methodology grounded in the hermeneutical phenomenology of Martin Heidegger (1927/2004) and Hans Georg Gadamer (1960/2004) was used. Briefly, the study participants, an entire human resource community, were interviewed using open-ended questions. Through the use of a hermeneutic process, themes emerged enabling the construction of theory. This study took a qualitative approach that focused on the interpretation of the knowledge-sharing experiences of 10 participants. Although conclusions have been derived from the data collected, generalization to other individuals or communities is not possible without further investigation. The study does, however, offer enough of an understanding of the personal interpretation of the knowledge-sharing experience that recommendations for scholars and practitioners can be proposed.

SUMMARY

In the current complex and uncertain world, individuals and organizations face many challenges. How they deal with these challenges will determine long-term survival. Current attempts by knowledge management practitioners are apparently driven by modern approaches to economics and society. The real answers to their problems, however, may only be found in postmodern methods. “Now more than ever [what is needed] is a holistic, long-range understanding of actions and events—let us call it wisdom—so as to avoid the unforeseen consequences of narrowly specialized interests and ways of knowing” (Csikszentmihalyi & Rathunde, 1993, p. 36). Longer range understanding may occur by using humanistic approaches to gain knowledge about individual understanding regarding knowledge-sharing experiences. In today’s organizations, which are geographically and culturally dispersed, these experiences are situated in various contexts: face-to-face, telecommunications, and virtual environments. Understanding how individuals are affected by these contexts as they relate to knowledge sharing could have beneficial consequences for both organizations and society. The most significant finding of this study was that the personal construct of trust has a direct and immediate effect on knowledge sharing. In a general way, this finding is not new to the literature. Allee (2003) indicated that knowledge sharing “cannot grow where there is no trust, [and] companies that create an environment of trust with strong social connections . . . are finding their culture to be source of competitive advantage” (p. 129). Based on the findings of this study, if researchers and management practitioners wish to increase knowledge sharing within and between organizations the development of an understanding of the nature of trust is vital. One reason is that “the levels of social capital and trust are declining precipitously in the Western world, especially in the United States” (Morris & Rodriguez, 2005, p. 95).

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