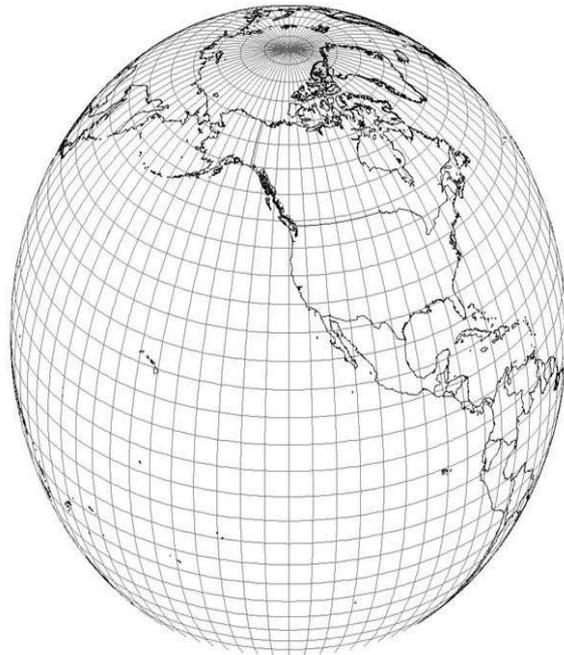


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Editors:

Dr. Dinesh K. Sharma
Fayetteville State University

Dr. Michael Monahan
Frostberg State University

Dr. Aaron R. Rababaah
University of Maryland Eastern Shore

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Editorial Notes

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Editors:

Dr. Dinesh K. Sharma

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THE PRACTICE OF CYBERSECURITY: A BUSINESS NEED

Ali Bicak, Marymount University, USA (abicak@marymount.edu)
Xiang (Michelle) Liu, Marymount University, USA (xliu@marymount.edu)
Diane R Murphy, Marymount University, USA (dmurphy@marymount.edu)

ABSTRACT

Information technology (IT) is an integral part of the economy, with many businesses linking to the Internet for some or all of their business operations. As a result, cybersecurity is on the mind of most of these businesses, particularly those who form part of the U.S. critical infrastructure. Major concerns include how to mitigate risks, how to meet changing regulatory requirements, how to manage customer access to information while maintaining privacy, how to avoid attack by hackers and the subsequent risk to reputation, how to ensure the confidentiality of intellectual property from insider threats, and much more.

Cybersecurity is no longer solely the province of computer engineering and computer science. It is now an important part of the business environment, and a real cost on the balance sheet. However, in academic circles many cybersecurity programs focus merely on engineering techniques and computer science principles.

The field of cybersecurity education has been evolving, beginning with the engineering of advanced networks and progressing with the ubiquitous role of cybersecurity practices in today's business world. The development of cybersecurity can be compared with the development of programming languages, from machine code through user-oriented fourth-generation tools and reusable code. Today, computer science departments cater to application developers who develop the basic building blocks of technology while business schools, through their information systems departments, cater to the much broader-based practitioners who will use technology to support business operations. This paper makes the case for cybersecurity programs to follow a similar path. There is a need for computer scientists and engineers to research and develop the next generation of security products (i.e., the role of computer science and engineering departments), but that there is also an urgent need for technical practitioners who can implement cybersecurity in all types of business (i.e., the role of business schools). This paper looks at the impact of cybersecurity in today's environment, the management of risk, and the development of education programs that prepares the practitioner workforce that can support all businesses, particularly those in the critical infrastructure.

MAKING THE CASE FOR CYBERSECURITY AS A BUSINESS CONCERN

Information technology (IT) is a vital part of the global economy, with many businesses using the public networks, notably the Internet, for some or all of their business operations – suppliers, partners, customers all included. As a result, these businesses are exposing themselves to threats that are well documented. In 2012 and 2013, there has been a heightened awareness to the need for cybersecurity defenses as data breaches and network attacks increase. According to the 2013 Data Breach Identification Report (Verizon, 2013), 37% of incidents involving the exposure of business information affected financial organizations, which are the suppliers and partners for many businesses. In addition, 24% of data breaches occurred in retail environments and some 20% of network intrusions were linked to the manufacturing, transportation, and utility industries. Many of these businesses form part of the US critical infrastructure and as such are a major concern for the country in general. President Obama highlighted the need to improve the cybersecurity of the critical infrastructure in Executive Order 13656, issued in February 2013 (President Barack Obama, 2013).

From a business perspective, these cybersecurity attacks affect every party from small businesses to multi-nationals, from customers to suppliers. Motivation for outsider cybersecurity attacks are very varied, from activist

groups, to criminal, to state-affiliated organizations. However, insider threats are seen also as a major issue for all organizations, sometimes even more severe than damage from outsiders (Silowash et al., 2012), as seen in the Wikileaks and NSA surveillance incidents. Major concerns for businesses include how to mitigate these risks (insider and outsider), how to meet constantly evolving legal and regulatory requirements, how to store and manage customer information while maintaining privacy particularly for personally identifiable information (PII), how to avoid attack by external hackers and the subsequent risk to reputation such as becoming high-jacked by a botnet, how to ensure the confidentiality of intellectual property from insider and outsider threats, and how to meet the increasing threat of cybercrime.

These are again substantiated in the Verizon breach report (Verizon, 2013). 75% of the cybersecurity compromises were considered as opportunistic attacks, many rated as low difficulty intrusions, and nearly two-thirds took months to discover, often by external parties and not by the company themselves. The report lists 14% of data breaches as insider threats and that most of these were deliberate or malicious in nature and arose from financial incentives. Some were deliberate attempts to steal proprietary information as people were terminated or on the way out the door. Some, however, were accidental such as “taking work home” via personal email accounts, sending sensitive materials to the wrong recipients, and mistakes by programmers and system administrators.

Symantec’s 2013 Internet Security Threat Report notes that small businesses are the path of least resistance for outside attackers (Symantec, 2013). The report reveals that in 2012, half of the targeted attacks were aimed at businesses with fewer than 2,500 employees. These companies are often less careful in their cyber defenses and so make themselves easy targets, particularly for criminals. In addition, the PWC 2013 review of cybercrime noted that cyber threats are so pervasive, that many businesses have come to accept the ever-increasing threat (PWC, 2013). The survey concludes that many companies have made little progress in developing ways to proactively fend off both internal and external intrusions.

Today, cybersecurity should be a core necessity for all business as concerns about data breaches, hacking, and theft of proprietary information increase. Companies must demonstrate proactive attention to defending their corporate resources from attack and so preventing the prohibitive costs associated with the impact of a cybersecurity incident: compromise of customer data, brand and reputation suffering due to a security breach, loss of intellectual property, noncompliance with regulations, and network downtime affecting business. In addition, a business’s ability to increase its bottom line may depend on its ability to interact with other businesses (suppliers, partners, customers) using public open networks such as the Internet.

Cybersecurity can be regarded as a governance issue where effective cybersecurity is a risk management proposition. Corporate officers have a fiduciary responsibility to secure their computer applications and the transmission of data between themselves and other organizations (Allen, 2005).

CYBERSECURITY SUPPLY CHAIN INTEGRITY

Today a business’ supply chain management strategy focuses almost entirely on the physical supply chain (products and services). However, it is important to recognize the impact of the virtual assets of a business. Cybersecurity is only as good as the weakest link in the entire supply chain process and so businesses must consider cybersecurity in terms of:

- Suppliers from trusted and untrusted sources;
- Partnerships, often with companies that may later become competitors;
- Integrity of the products used in cybersecurity defenses;
- Transactions between businesses and customers, in many cases over the Internet;
- Communications channels including intra-business networks over private networks;
- Customer relations with the transfer of personally identifiable information a(PII); and
- End-to-end systems created by the amalgamation of the piece parts, often from multiple sources, which may or may not be trusted.

The Symantec report details how an attacker may be deterred by a large company’s defenses and, therefore, may select to breach the lesser defenses of a small business that has a trusted business relationship with the main target

for the exploit (Symantec, 2013). In addition, there is evidence of compromises of small business web sites being used to attack other company sites.

All businesses in the supply chain are responsible for supply chain integrity. The IT industry has long been affected by the “gray market” including unauthorized dealers, brokers and the open market, which originally was considered as a profitability issue (KPMG, 2003). In 2008, the FBI acknowledged that government agencies purchased networking equipment that was determined to be counterfeit through an online broker (Dix, 2013). This is also a common practice in businesses in all parts of the supply chain (physical and virtual) as companies submit to the pressures of cost and schedule (Dix, 2013). Today we need to look specifically at these factors in the context of the cybersecurity supply chain as these products obviously provide opportunities for hackers to enter a system for malicious purposes.

Software is an integral part of this environment as third party software is the basis of the technology infrastructure that is critical to businesses today. The efficacy of such software, outsourced and developed in many parts of the world, raises concerns about its security and potential as a source of malicious activities (Simpson, 2009).

There are several international standards that apply to the operation of the supply chain including ISO 27001 for information security (<http://www.27000.org>), ISO 9001 for quality management systems (www.iso.org), and the Common Criteria product certifications (<http://www.commoncriteriaportal.org/>). Best practices are also available from organizations such as O-TTF (The Open Group Trusted Technology Forum), the Alliance for Gray Market and Counterfeit Abatement and SAFECode (Software Assurance Forum for Excellence in Code). Best practices include component integrity assurance, traceability of products and components, supplier selection, information security and incident response. These cover both the physical and virtual supply chains.

Despite standards and best practices, there are gaps and contradictions that contribute to supply chain risk. These include purchasing from unauthorized and untrusted sources, lack of adequate information sharing as a means toward situational awareness, limited incentives for businesses to certify their security practices, and limited education and awareness programs stressing the need for cybersecurity controls throughout the supply chain. As businesses actively engage in the global supply chain, so there is an increased need for employees who are knowledgeable about the practice of cybersecurity.

UNIVERSITY PROGRAMS

Programs focusing on cybersecurity have been around for nearly fifteen years, with a major influence being designation by the National Security Agency/Department of Homeland Security as a National Center for Academic Excellence and the award of grants for the CyberCorp Scholarship for Service (SFS) program from the National Science Foundation (Anderson, 2013). These programs are relatively new considering the history of cybersecurity certifications, such as the Certified Information System Auditor (CISA) in 1978 and the Certified Information Systems Security Professional (CISSP) in 1994.

Most of the early cybersecurity academic programs were at the graduate level and were part of computer science and computer engineering programs. However, there is an increasing need for cybersecurity practitioners with diverse skills (technical and management) to meet the increasing range of cybersecurity positions, in government, and increasingly in business. Some of these needs include technical areas such as malware analysis, penetration testing, secure software testing, and computer forensics. Other needs include management skills such as governance, policy development, and compliance. It is recognized that a “one-size fits all” curriculum does not exist and the field of cybersecurity has matured and grown to enable multiple programs to exist side-by-side.

The development of cybersecurity can be compared with the development of programming languages, from machine code through user-oriented fourth-generation tools and reusable code (Sebesta, 2012). Today, computer science departments cater to application developers who will join the workforce developing the basic building blocks of technology while business schools, through their information systems departments, cater to the much broader-based technologist who will use technology to support business operations (the technology practitioner).

Cybersecurity programs are beginning to follow a similar path. There is a need for computer scientists and engineers to research and develop the next generation of security products (i.e., the role of computer science and engineering departments). There is also an urgent need for practitioners, technical and management individuals who can implement cybersecurity tools and practices and lead the cybersecurity evolution in all businesses in the supply chain (i.e., the business schools).

IBM, in a recent study, surveyed faculty members from 15 programs in six different countries and found four common trends (IBM, 2013). The first trend was that information security is increasing in relevance, such that computer security is now important to more than just national defense, it is part of our daily lives. The second trend is the increasing demand from private industry, as well as government agencies, particularly banks and financial service firms and healthcare companies. A third trend noted was the increase in topics to teach as the field matures and expands. Finally, they noted that academic programs must move away from teaching purely the principles and theory of security to focus more on the practices.

There is an increasingly important need to integrate cybersecurity into the business field. An example of this is the Master of Cybersecurity and Leadership (MCL) taught at the University of Washington, Tacoma as a partnership between the Institute of Technology and the Milgard School of Business (Goda & Friedman, 2012). The program teaches the principles of cybersecurity and then examines how it will impact the business world, including risk management and designing and executing a cybersecurity strategy.

DESIGNING A PROGRAM FOR CYBERSECURITY PRACTICE

At Marymount University, the Information Technology department is included in the School of Business Administration. This has proved invaluable in the development of information technology and cybersecurity programs that combine technical and business interests. The Master of Science in Information Technology program, revamped in 2008, allows students to specialize in a concentration, selecting from software engineering, healthcare informatics, cybersecurity (computer security and information assurance), and project management and technology. (More details are available at <http://www.marymount.edu/academics/programs/infoTechMS>). The development of a cybersecurity focus within an existing information technology program was not new (Petrova et al., 2004). In this program, a Master of Information Technology was extended by adding an information security paper to the program.

In fall 2010, Marymount University also introduced dual degrees that allowed students to intertwine the information technology master degree (with no specialty) with either the MBA degree or the MS in Healthcare Management as illustrated in Figure 1.

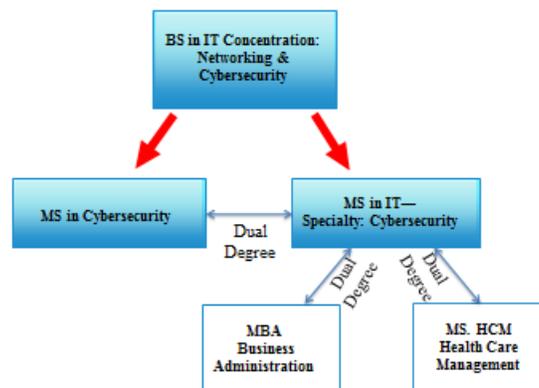


Figure 1. Marymount University Dual Degree Program Pairs

These dual degrees have been popular with students who see the relationship between business (general or healthcare) and who wish to differentiate themselves in the technology-influenced business environment.

Extending the cybersecurity offerings in our programs is important based on input of students and discussions with employers in the area (government and business). Marymount University is in the Washington, DC area and is close to many of the centers of cybersecurity practice in the country. Many potential students are already knowledgeable in information technology principles and practices but are interested in advanced courses in cybersecurity, either to support their existing positions or to transition into the cybersecurity realm.

As a result of these activities, Marymount University developed the Masters in Cybersecurity program in 2010 and it was approved by the institution’s curriculum committee in spring 2011. The design of the program included the need for all graduates to have an understanding of cybersecurity principles as well as the business practices associated with cybersecurity. Information technology knowledge is a requirement to enroll in the program and computer networking is a prerequisite. The 36-credit program is divided into 3 modules: the first is an understanding of cybersecurity principles, the second is an appreciation for management skills such as ethical behavior, policy development, project management, and compliance, and the last segment allows the student to select three elective courses (technical or management) to fit in with their career goals.

Since our target audience was largely working IT or cybersecurity professionals, a decision was made to offer the majority of courses online to support the IT professional, either working extended hours or subject to on-call performance as both of these make attending face-to-face classes on a regular basis difficult. Courses in the program are shown in Table 1.

Required	Electives
<p>Cybersecurity Technology IT530 Computer Security IT535 Advanced Computer Security IT560 Cryptography IT670 Computer Network Defense</p>	<p>Cybersecurity Electives (select 3) IT537 Computer Forensics and Incident Response IT547 Security and Privacy of Documents IT557 Monitoring, Auditing, and Penetration Testing IT567 Global Cybersecurity IT577 Human Considerations in Cybersecurity IT87 Cybersecurity Systems: Certification and Accreditation</p>
<p>Cybersecurity Management IT570 Cybersecurity: Law, Policy, Ethics and Compliance IT575 Information Security Management MSC545 Project Management IT585 Managing IT Professionals</p>	
<p>Cybersecurity Capstone IT690 Cybersecurity Capstone Project</p>	

Table 1. Cybersecurity Master Program Course Requirements

In addition, in 2013 we added a dual degree with an MS in IT and MS in Cybersecurity programs as shown in Figure 1. This dual degree is designed for those who do not have the fundamental skills to enter the cybersecurity program, and so combines knowledge of information technology assets before the more specific cybersecurity courses.

CHANGING REQUIREMENTS FOR CYBERSECURITY EDUCATION

The Colloquium for Information Systems Security Education (CISSE) is one of the leading proponents for cybersecurity education at the college level (www.cisse.info). In defining requirements for cybersecurity education, CISSE has long encouraged university programs to receive the National Security Agency/Department of Homeland Security designation of National Center for Academic Excellence Information Assurance Education

(CAE/IAE) (Anderson, 2013). Until very recently, this designation required meeting the criteria defined by Committee on National Security Systems (CNSS). The CNSS defined several standards for training INFOSEC professionals including system administrators (CNSSI-4013), senior system managers (CNSSI-4012), system security officers (CNSSI-4014), system certifiers (CNSSI-4015) and risk analysts (CNSSI-4016). These standards are now changing as the National IA Education and Training Programs (NIETP) office, the organization that designates CEA/IAE institutions, is updating its criteria “to better reflect the state to which the discipline of IA has evolved since the original publication of the training standards” (www.iad.gov/NIETP). They are now using a framework of knowledge units and focus areas that allow differentiation amongst the schools by recognizing the specific areas in which they focus their research and/or educational offerings (e.g., digital forensics or supply chain integrity). These standards are well aligned with the NIST National Initiative for Cybersecurity Education (NICE) Framework (<http://csrc.nist.gov/nice/framework>).

The NICE framework categorizes the cybersecurity skills and knowledge units in seven groups recognizing the need both for technical and managerial skills and knowledge background in implementing a coherent cybersecurity program. For instance, the NICE category "Protect and Response" focuses on the technical skills required by incident responders, computer network defenders, vulnerability analysts, whereas the category "Oversight and Development" focuses on the legal and business skills and knowledge units required by policy developers, legal counsels, and chief information security officers. Evidently, all this skill set and others listed in the rest of NICE framework are equally important and required to implement a comprehensive and coherent cybersecurity program.

The practice of cybersecurity is needed in the current business environment, and so this should be reflected in the current university cybersecurity programs. Marymount University believes it has introduced such a program under its School of Business Administration to respond to this very need in the current market. Similar programs have been emerging at other colleges in the DC metro area as well as nationwide, as in the case of MCL program at University of Washington Tacoma. This seems to be the right trend in training and educating the cybersecurity professionals wanted within the next decades (Gupta, 2010).

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THE DISTRIBUTION OF HUMAN WEIGHT ON THE SEAT SURFACE FOR THE IMPLEMENTATION OF FINITE ELEMENT ANALYSES FOR SEAT COMFORT EVALUATION

Saed Amer, Postdoctoral at Tennessee State University, USA (samer01@my.tnstate.edu)
Landon Onyebueke, Professor at Tennessee State University, USA (lonyebueke@tnstate.edu)

ABSTRACT

Contact pressure is learned to have considerable effects on the comfort level of most furniture especially seats. Research and experimentation show an inverse proportionality between the contact pressure and the comfort level i.e. more contact pressure leads to less seat comfort. Hence, it is important to learn how the human body is optimally situated on top of the seat surface considering the contact area and load distribution to help design for more comfortable seats. A study is performed to replace such traditional methods with a computer simulation to perform contact pressure detection. The main tool employed in this study is the Finite Element Analysis (FEA) for contact pressure analyses. The main objective of this paper is to demonstrate the experimental validations needed to reveal the actual distributions of the human sitting and calibrate the simulation tool. Five human participants were employed to study their weight distributions on seven seats arrangements with different features. The outcomes were compared to the weight distributions obtained from the simulation process. The outcomes show that the calibration process adds 23% accuracy to the simulation process.

Keywords: Seat Comfort, Computer Aided Design, CAD, Finite Element Analysis, FEA.

INTRODUCTION

A comfortable seat is the one that can provide adequate body posture and support without excess physiological pressure points while maintaining an overall occupant well-being (Amer et al., 2011). Seat comfort depends on several factors that may be subjective or objective. Subjective factors are usually driven by psychological preferences; meanwhile, the objective factors are measurable and controllable. Some of the objective factors include physical factors that influence seat comfort such as Biomechanics and Physiological factors (Reed et al., 1991), vibration evaluation (Nilsson et al., 2006), thermal and humidity factors (Ormuz et al., 2004). The most considered factor for comfort research is the investigations of contact pressure distribution between the human and the seat. The correlation between objective and subjective data suggests that decreasing the contact pressure between the human and the seat brings about more comfort (Milivojevich et al., 2000). Contact pressure measurement is usually obtained using pressure mapping systems such as TekScan Body Pressure Measuring System (BPMS) which provides static and dynamic representations of the measured effectors in different units. One of the implementation of the Tekscan BPMS for seat comfort analysis is performed by Ojetola et al. The study employed the pressure mapping to evaluate the seat comfort for ejection seats with regards to three different rail angles (Ojetola et al., 2011). The advancement of CAD in the industry enhances the continuous design with better product competitiveness and improves quality by reducing resource consumptions. CAD also promotes information sharing which expedites the design process. Mamat et al recognized these benefits and performed a work that employs CAD in the design of new seat products that relates to comfort based on the ergonomics view and ease of assembly (Mamat et al., 2009). Tang et al. accomplished another study on using finite element analysis approach to detect the areas of high contact pressures between seat cushion and human buttock-thigh tissue (Tang et al., 2010). FEA can be described as a technique that demonstrates the reaction of an object in CAD due to excitations; this may include force loadings, contact pressure, thermal excitations of fluid motion (Pileicikiene et al., 2007). FEA is endorsed and implemented in other studies as a valid tool to detect the areas of high contact pressure. The main goal of this paper is to perform a laboratory testing to establish the distribution of the human weight on top of the surface of the seats with different components. Then validate and examine the

level of accuracy of the CAD system for seat comfort analysis and its ability to expedite the design process of new seats endorsed with high comfort levels.

METHODOLOGY

Initially, the experiments were geared to validate the different factors established as influential on seat comfort analysis. These factors include occupant's weight distribution, seat components, seat measurements, seat adjustability, cushion material properties and occupant's anthropometry. The human subjects' weights and anthropometric measurements were taken. The anthropometric variables considered in this study are selected to agree those recommended by Reed (*Reed et. al., 1994*). The number of participants selected for this study was selected as a sample that agrees to the mean and standard deviation of the civilian distributions from NHANES3. CAD modeling of the human being was achieved with correct anthropometrics that reflects those of the participants. The models were also simulated with the proper quasi-linear viscoelastic material properties that allow its interaction to external loading to behave similar to human flesh and bones (*Reed et. al., 1994*). The seat models were constructed in the CAD system to mimic the actual seats used in the experiments. The results obtained from the Tekscan Pressure Mapping System can be presented in several forms but the most considered form was the three dimensional mapping of the pressure points to be in accordance with the results obtained by the Finite Element Analysis. The unified representation of the results is important for the researcher to be able to compare and contrast the outcomes of the proposed system to those of the real-life experimentations. The investigation of regions of high contact pressure between the human subject and the seat surface is widely considered for seat comfort evaluation. Hence, the experiments were carried out to examine the distribution of the occupant's weight because it plays a major role in increasing the contact pressure then the sitting scenario is simulated to validate the system's ability to properly distribute the weight. The preliminary experiments were geared toward calibrating the needed tools including the load measuring devices and the pressure mapping system. Few of the experiments were performed using Tekscan Pressure Mapping System to investigate legitimacy of the CAD based technique. The main experiments performed for this study examines the distribution of loads exerted on the different components of the seat by the occupant's weight then use it to validate the modeling of the seat and its simulated reaction when loaded using the Finite Element Analysis.



Figure 1. TekScan Body Pressure Measurement System (BPMS)

The Weight Measuring Tool Selection and Calibration

The first tool considered in achieving the adequate CAD validation is a load measuring device that can measure the different loads that are exerted on the seat surface by the occupant. Due to the special settings of the experiment, the measuring tool needed for the human-seat interface experimentation must have high readability, memory feature, continuous reading capability, flat surface and can operate on top of seat cushion as well as on a hard surface. A Taylor scale model number 7544BL was selected and calibrated using standard weights and laboratory-utilized high precision scales model S5000.

Contact Pressure Measuring Tool Selection and Calibration

In order to validate the outcomes of the CAD technique, a device is needed to obtain the contact pressure between the human body and the seat surface. Several devices were considered for this study; however, the team selected the TekScan Body Pressure Measurement System (BPMS). Figure 1 illustrates the implementation and output representations of the selected device. BPMS comply with the needed features and can provide the outcomes as a map that represents the pressure magnitude and location in relation to the human body. Calibrating the BPMS is performed on seven (7) different sitting scenarios where the outcomes of the BPMS are compared to those obtained by the calibrated weight measuring device. Figure 2 illustrates the outcomes obtained by the BPMS

compared to the ones of the calibrated scale.

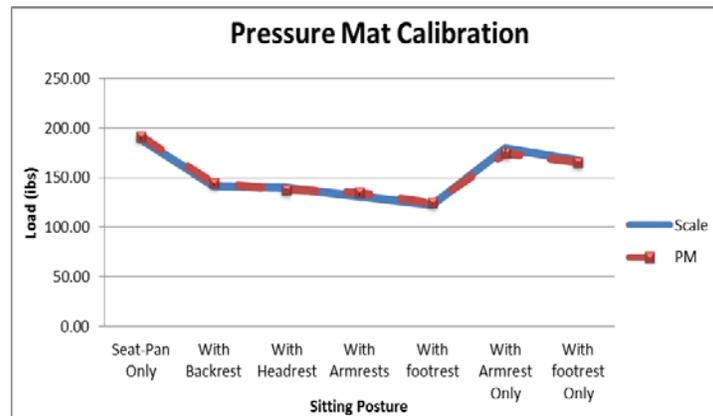


Figure 2. Pressure Mat Calibration Graph

OCCUPANT'S WEIGHT DISTRIBUTION INVESTIGATION

The first step taking in this procedure is the collection of the participants' personal information including the anthropometry, gross weight, gender and age. The second step considered is obtaining the seats measurements including the seat pan height, backrest height, armrest height, backrest angle, Headrest height and footrest height. The next step is setting up the experimental test bed by obtaining the seat and removing all the features that promote contact area. In other words, the seat will have only a seat pan removing the armrests, backrest, headrest and footrests. The weight measuring tool (Tekscan BPMS) will be placed on the seat pan and the participant are asked to sit up on the device with the back in straight up position not touching the back support and arms on the thighs. Laboratory experimentations and literature surveys agree that adding seat features provide more contact area between the seat and the occupant (Kolich et. al., 2004; Verver et. al., 2005); hence, it is important to consider the effects of the seat features on the comfort evaluation process. In this study, seat features are retrofitted to the seat and the weights are collected. Table 1 shows that the seat features are gradually added to the tested seat and the weights are collected. The collected data shows the decreasing of the weight on the seat pan as more seat features are added. The distribution of the gross weight of the occupant is then calculated based on the difference of the weight formed by resting the occupant on more seat surfaces.

Table 1. The weights of a participant are collected as more seat features are added and the contact area is increased.

	1	2	3	Average (lb.)
Gross Weight	185.4	185.4	185.3	185.38
Seat-Pan Only	168.40	169.40	170.30	168.38
With Backrest	143.40	144.40	145.30	142.38
With Headrest	140.40	140.40	141.30	138.38
With Armrests	137.40	137.40	138.30	135.38
With footrest	113.40	113.40	115.30	112.38
With Armrest Only	181.40	180.40	181.30	180.98
With footrest Only	157.40	160.40	158.30	157.98

FINITE ELEMENT ANALYSIS (FEA) VALIDATION AND CALIBRATION

The validation process of the FEA technique requires proper modeling of the human participants and of the tested seat. The sitting scenarios are then simulated using CAD to perform the analysis for the ones representing the

sitting postures of the actual experiments. FEA for seat comfort considers the loading observed from the human weight produced by earth gravitation pull. Then the interaction between the human body and the seat surface are analyzed to discover the regions of high contact pressure. In the validation process, the distributions of the human weight are compared to the ones obtained from the corresponding sitting experiment. Furthermore, CAD allows the designer to calibrate the FEA tool to converge the outcomes until it concurs with the ones of the real world scenarios. The outcomes are presented in a three dimensional map that gives the researcher better sense of the position and magnitude of the contact pressure. Figure 3 shows the FEA results mapped on the original model making it easy to find the location of the high contact pressure in relation to the touching surfaces.

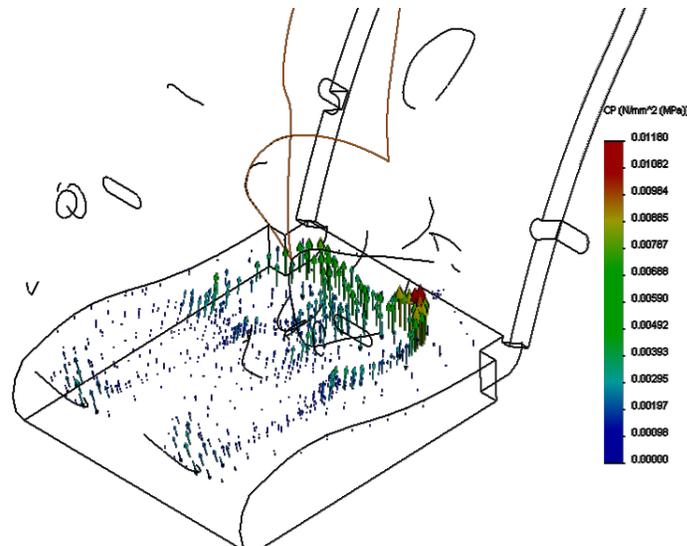


Figure 3. Contact Pressure in Finite Element Analysis

RESULTS AND DISCUSSIONS

Each participant had to perform seven sitting scenarios where the seat starts with seat pan only then more features are added including backrest, headrest, armrest then footrest. The data obtained from the experiments were tabulated and conditioned then plotted with reference to seat features.

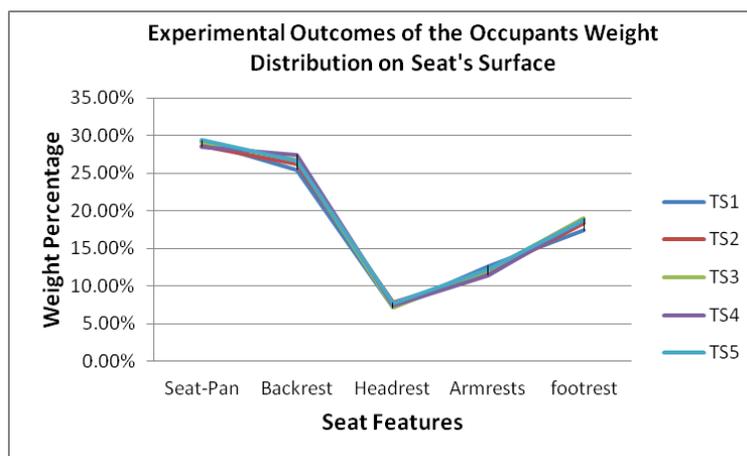


Figure 4. Outcomes of the Experimental Process for Occupant's Weight Distribution on Seat Parameters

Figure 4 illustrates that each seat feature accommodates a percentage of the occupant's total weight. It is also clear that the importance of each feature pertaining to cushion comfort is driven by the weight distribution as more

weights dissipate to the seat features, more comfortable gets the seat. For example, the outcomes show that the seat pan accommodates the highest percentage of weight therefore, it is important to put more emphasis on the seat pan analyses for comfort. The averages of outcomes obtained from the experiments are conditioned to represent the percentage of the weight distribution on the different seat features. The validation process was performed by comparing the experimentation outcomes with the one obtained by the CAD simulation process.

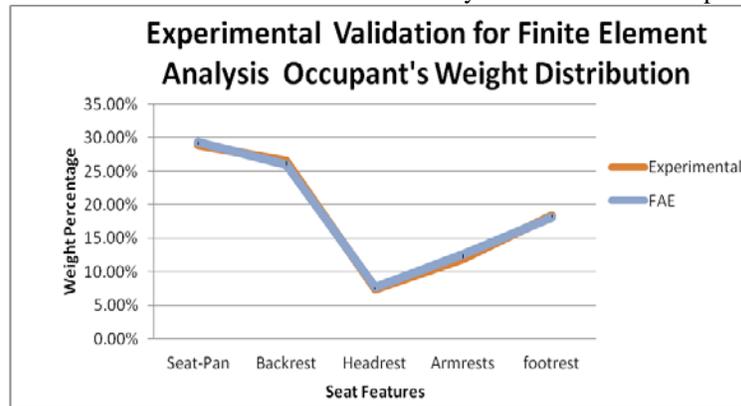


Figure 5. Correlation Comparison of the Experimental and FEA Outcomes

Illustrated in Figure 5, the comparison of the two outcomes (Experimental and FEA) shows great correspondence when tested for different seat features. A T-test analysis was performed to test the correlation between the actual and simulated results. After the calibration process, the outcomes show a correlation level of 99.4%. The error manifested in this study can be related to the sensitivity of the human modeling including body properties and anthropometry. Comparing the data with ones obtained before the FEA calibration the outcomes show 23% improvement when compared to the traditional techniques used for seat comfort evaluation (See Figure 6).

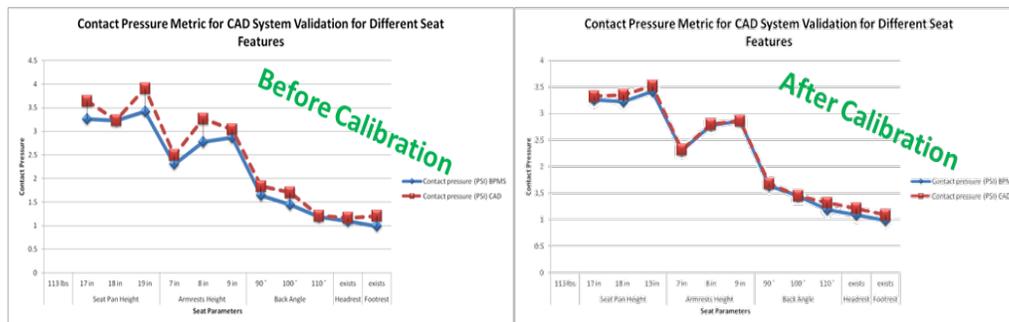


Figure 6. Overall system validation shows a 23% improvement after the FEA weight distribution is calibrated

CONCLUSIONS

This study is relevant to a work performed by the Center of Excellence for seat comfort at Tennessee State University. The original study aims to enhance the seat comfort analyses through integrating three systems that collect data from the customer and use it in a CAD tool to perform seat design and comfort analyses. Finally, the data are fused in a mathematical prediction model and provides a value that represents the comfort level for the tested product. Established from this work that the contact pressure produced between the occupant and the seat is the most considered methodology to investigate the comfort level of the seat. Furthermore, it is important to understand the affect of the human weight distribution on the seat surface. Laboratory experiments are performed to investigate the percentage of the occupant’s weight distributed on the different seat components. Five human subjects were employed to sit on different postures to study the effect of the additional seat features such as backrest, armrest, headrest and footrest. The outcomes show that the seat pan takes about 30% of the total weight, 27% of the weight is dispersed on the backrest, 8% on the Headrest, 13% on the armrest, and 19% is distributed on the footrest. The information obtained from experiments is used to validate and calibrate the FEA tool used to investigate the regions of high contact pressure. The calibration is performed by changing the material properties

of the human model and the force parameters. The outcomes show a percentage of 99.4% correlation between the FEA and the actual experimentation proving that the proposed FEA tool is a valid tool that can perform seat comfort analyses without the need for physical prototypes.

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DEVELOPMENT OF RULE BASED SYSTEM USING INTELLIGENT TECHNIQUES TO DIAGNOSE LIFE THREATENING DISEASES

Dinesh K. Sharma, Fayetteville State University, USA
H.S. Hota, Guru Ghasidas Central University, (C.G.), India

ABSTRACT

Data mining is a process of extracting relevant information or knowledge from large databases to be used in the decision-making process and are widely used in medical diagnosis process due to its effective and efficient classification capabilities. In this paper, we have applied decision tree (DT) based techniques with special reference to feature selection; decision tree induced by DT based algorithms are used for rule base development to diagnose many life threatening diseases like Diabetes and Breast Cancer. DT based models developed with the help of training data are compared on the basis of sensitivity, accuracy, specificity, precision and F-Measure. Feature selection technique is further applied to reduce features from the health care data on the best obtained model and hence to reduce the number of rules from the knowledge base for efficient and effective inference process. Results are promising in case of both health care data sets with only 3 and 8 rules respectively for Diabetes and Breast Cancer. Experimental work is carried out with WEKA open source data mining tool.

Keywords: Decision Tree (DT), Decision Support System (DSS), Rule Base, WEKA.

INTRODUCTION

In the medical domain, data mining techniques are successfully applied to classify various health care related data either collected from the hospitals or downloaded from some repository sites. Using these classifiers, various decision support systems (DSS) have been developed to assist physicians and medical students to make appropriate decisions related to a particular disease. Over the years, many authors (Kurt et al., 2008; Razi et al., 2005; Ramana et al., 2011; Gupta et al., 2011; Albert et al., 2012) have applied decision tree (DT) based data mining techniques due to its capability of classification with very high accuracy. Most of these techniques have compared their models with some other techniques like self-organizing map (SOM) and found DT techniques as one of the best techniques.

Various literature proves that DT based techniques are very common among the researchers to be applied on health care data classification for screening and diagnosis and becoming very popular to extract hidden information and knowledge from the health care data. This paper explored decision tree (DT) based algorithm to develop a rule base to effectively diagnose some life threatening diseases like diabetes and breast cancer with special reference to feature selection. Five different DT based algorithms: Interactive Dichotomiser 3 (ID3), C4.5, Classification and Regression Tree (CART), Quick, Unbiased and Efficient Statistical Tree (QUEST) and Chi-Squared Automation Interaction Detection (CHAID) are applied on two data sets of diabetes and breast cancer. Rank based feature selection was applied to reduce irrelevant features from the health care data sets. The results obtained through WEKA open source data mining software was evaluated in terms of accuracy, sensitivity, specificity, precision and F-measures. C4.5 based model with two features for diabetes data and three features for cancer data set produced highest accuracy of 78.43% and 95.91% respectively. A DSS is also proposed to be developed to assist doctors and medical students in the future.

METHODOLOGY

Decision tree (DT) (Han et al., 2011) is a most popular and powerful classification technique where each internal node (non-leaf node) denotes a test on an attribute, each branch represents an outcome of the test, and each leaf node (or terminal node) holds a class label. The top most nodes in a tree are the root nodes. DT is so popular

because construction of DT classifiers does not require any domain knowledge or parameter setting and, therefore, is appropriate for exploratory knowledge discovery. Various decision tree based techniques are widely accepted and applied on health care diagnosis process based on rules generated to develop a DSS to be used by doctors and medical students.

Interactive Dichotomiser 3 (ID3) and C4.5 are the two very popular DT algorithms (Quinlan, 1993). C4.5 is a successor of ID3 in terms of removing the problem of bias over attributes of higher values in ID3, both algorithms split the tree based on features available in the data set using information gain ratio. After constructing DT with training samples, testing samples can be used to check the performance of classifier. On the other hand, classification and regression tree (CART) (Breiman, Friedman, Olshen & Stone, 1984) and Chi-Squared Automation Interaction Detection (CHAID) are other classifications algorithms which are based on DT induction (Han et al., 2011). CART method uses recursive partitioning to split the training records into segments with similar output field values using Gini index. While CHAID (Hartigen, 1975; Pujari, 2001) DT is constructed by partitioning the data set into two or more data subsets, based on the values of one of the non-class attributes, the number of subsets in a partition can range from two up to the number of distinct values of the splitting attribute. In this regard, CHAID differs from CART, which always forms binary splits (two subgroups). CART typically requires less data preparation than CHAID (Lee and Siau, 2001). Another algorithm Quick, Unbiased and Efficient Statistical Tree (QUEST) (Loh & Shih, 1997) is equivalent to CART in many ways; however, QUEST uses an unbiased variable selection technique and is least efficient as compare to other DT algorithms explained above. In a nut shell, we can conclude that ID3 and C4.5 uses Entropy based information gain, CART uses the Gini index and CHAID uses the chi-squared test for splitting and constructing DT.

Feature subset selection (Wang, 2003) is an important problem in knowledge discovery, not only for the insight gained from determining relevant modeling variables, but also for the improved understandability, scalability, and possibly, accuracy of the resulting models. In the feature selection, the main goal is to find a feature subset that produces higher classification accuracy. Feature selection technique with feature ranking is applied to select best feature subset. The simple feature selection procedure is based on evaluate of classification power of individual features, then ranking such evaluated features, and eventually selecting the first best features. A criteria applied to an individual feature could be of either of the open-loop or closed-loop type. This also relies on an assumption that the final selection criterion can be expressed as a sum or product of the criteria evaluated for each feature independently. We can expect that a single feature alone have a low classification power. However, this feature, when put together with others, may exhibit substantial classification powers.

MEASUREMENT OF MODELS

Any classification model can be evaluated using some well-known performance measures like the following: accuracy, sensitivity specificity, precision, and F-measure. These measures are defined by true positive (TP), true negative (TN), false positive (FP) and false negative (FN) under positive (P) and negative (N) cases ((Han et al., 2011; Sharma & Hota, 2013). Most of the authors (Kurt et al., 2008; Razi et al., 2005; Ramana et al., 2011; Gupta et al., 2011; Albert et al., 2012) have used these measures to evaluate their proposed classifier. Most of them have used the first three measures. Equations of all the above measures in the case of two class medical problems can be expressed as below:

$$\text{Accuracy} = (TP + TN) / (P + N) * 100 \quad (1)$$

$$\text{Sensitivity/Recall} = TP / (TP + FN) * 100 \quad (2)$$

$$\text{Specificity} = TN / (TN + FP) * 100 \quad (3)$$

F-measure is the harmonic means of precision and recall as below:

$$2 * (\text{precision} * \text{recall}) / (\text{precision} + \text{recall}) * 100 \quad (4)$$

Precision and recall are further defined as below:

$$\text{Precision} = TP / (TP + FP) * 100 \quad (5)$$

Accuracy measures the proportion of correctly classified samples, sensitivity and specificity, as shown in equations (2) and (3) respectively measures the model's ability to classify the individual groups within itself. F-measure is a function of confusion matrix defined with TP, TN, FP and FN. Accuracy measures clearly reflect the classification ability of the model but may produce bias evolution results; this is why models can be verified with some other measures explained above from equations (2) to (5).

EXPERIMENTAL WORK

A typical view of this research work is depicted in Figure 1 in which health care data is applied to the various decision tree (DT) based algorithms to build classifiers for life threatening diseases and to extract knowledge in the form of rules to be kept along with inference engine to develop a decision support system (DSS). The inference process will start based on data supplied through graphical user interface by the end user and by extracting and manipulating rules stored in knowledge base by inference engine, an optimized knowledge base will produce results in efficient manner. Hence, rules of the knowledge base are optimized using ranking based feature selection technique to construct three and eight rules only, respectively to diagnose diabetic and breast cancer related problem. A graphical user interface (GUI) based system is proposed to be developed as an outcome of this research work to be used as a medical tool. There are two different cases (modules) of DSS based on two different life threatening diseases that are explained below:

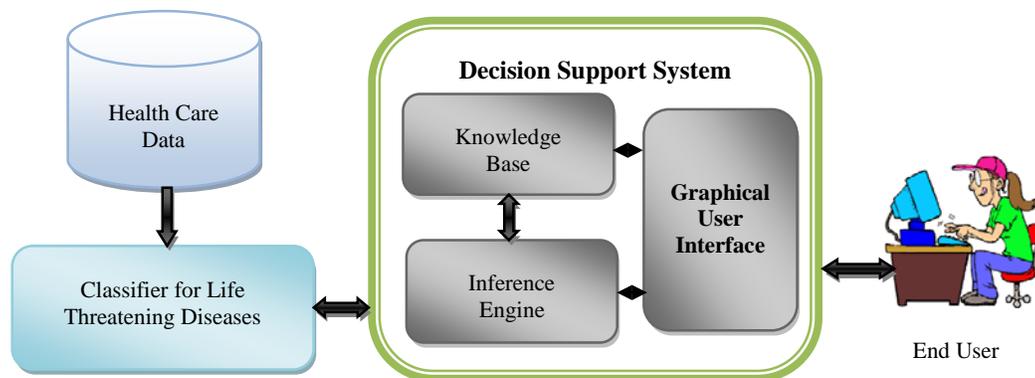


Figure 1: An Interactive Architecture of Health Care Decision Support System

Case 1: Pima Indian Diabetes –Diabetes is one of the very common diseases found in both men and women and may cause many other diseases like heart problem, kidney failure, and loss of vision, etc. There are two types of diabetes: Type 1 and Type 2. An early detection of this disease is very essential for proper medications. To develop a DT based models to diagnose diabetes of a patient, the data set downloaded from the University of California of Irvine (UCI) repository site (2012) was used. This data set comprises 768 instances in all, out of which 500 are non-diabetic while the remaining 268 are diabetic data with 8 different features (attributes) as shown in Table 1 along with two classes representing 1 for diabetic and 2 for non-diabetic. Data set is partitioned as training and testing sets respectively with 65% and 35%. Experimental work is carried out with the latest version of WEKA (2013) open source software which provides a comprehensive collection of machine learning algorithms for data mining tasks with interactive GUI. A train data and test data are applied either directly through Excel file or WEKA data file, and results are calculated in terms of error measures (accuracy, sensitivity, specificity precision and F-measures) using equations 1-5 and presented in Table 2. From this Table, it is clear that C4.5 is performing better than other models with 76.56% accuracy followed by ID3 (74.34%), CHAID (71.54%), CART (70.41%), and QUEST (69.29%). Models other than ID3 are more sensitive than C4.5; however, other error measures are varying from one model to another model.

Case 2: Breast Cancer – Breast cancer is a very common disease commonly found in women, the abnormal growth of cells in the breast is the main cause of breast cancer, which may be of two types: benign (Non-

cancerous) and malignant (Cancerous). A proper and prior diagnosis of this disease is essential for medications. Breast cancer data set used for experimental purpose was also downloaded from the UCI repository site (2012). The data set has 699 instances in all, divided into benign and malignant, with 458 instances and 241 instances respectively with 10 input features (attribute) and one output feature, nine features are considered for input after excluding sample code number. The detail of data set is presented in Table 3. Results obtained after simulation are shown in Table 4 with all error measures with highest accuracy of 95.10% again in the case of C4.5 model followed by the other four DT based models: CHAID (95.0%),QUEST(94.16%),CART(93.75%) and ID3(92.08%). Other measures in this case are consistent.

ID	Feature
A	Number of times pregnant
B	Plasma glucose concentration
C	Diastolic blood pressure
D	Triceps Skin fold thickness
E	2-hour serum insulin
F	Body mass index
G	Diabetes pedigree function
H	Age
Class	1 for diabetic and 2 for non-diabetic

Model	Accuracy	Sensitivity	Specificity	Precision	F-Measures
ID3	74.34	51.06	86.85	67.60	58.18
C4.5	76.57	75.0	77.34	61.68	67.69
CART	70.41	88.46	45.04	69.34	77.74
QUEST	69.29	89.10	41.44	68.13	77.23
CHAID	71.54	87.82	48.64	70.61	78.28

ID	Feature
A	Sample code number (ID)
B	Clump thickness (CT)
C	Uniformity of CELL SIZE (UCS)
D	Uniformity of cell shape (UCSh)
E	Marginal adhesion (MA)
F	Single epithelial cell size (SECS)
G	Bare nuclei (BN)
H	Bland chromatin (BC)
I	Normal nucleoli (NN)
J	Mitoses (M)
Class	2 for benign and 4 for malignant

Algorithm	Accuracy	Sensitivity	Specificity	Precision	F-Measures
ID3	92.08	97.41	82.35	90.96	94.08
C4.5	95.10	97.38	91.30	94.90	96.12
CART	93.75	96.22	91.79	90.26	93.15
QUEST	94.16	95.28	93.28	91.81	93.51
CHAID	95.00	94.33	95.52	94.33	94.33

FEATURE SELECTION AND RULE BASE DEVELOPMENT

In this research work, a rank based feature selection technique was applied to extract irrelevant features from both the data sets. After applying feature selection technique on diabetic data set, ranking of the features obtained are shown in the first row of Table 5, i.e., B, F, H, A, E, G, D, C, where feature B has the highest rank while C has the lowest rank. Similarly feature selection algorithm has ranked features of breast cancer data as I, F, C, G, D, H, J, E, B, A (left is highest) as shown in Table 6. Features of both the sets are extracted one by one starting from the lowest rank feature to obtain new feature subsets as shown in Tables 5 and 6 respectively for diabetic and breast cancer.

C4.5 model is then trained and tested with reduced feature subsets of diabetic data set one by one and error measures are calculated. It can be clearly observed and analyzed that applying feature selection technique on both data sets has many advantages in terms of various pathological tests required to diagnose diabetic disease of the patient because the model is performing well with the minimum number of feature subsets. Highest accuracy (78.43%) has been obtained with only two features in this case. Hence, to diagnose diabetes with DSS, we need to develop three rules based on selected features: Plasma glucose concentration and body mass index as shown below:

- R1: IF Plasma glucose concentration is ≤ 127 THEN non diabetic.
- R2: IF Plasma glucose concentration > 127 AND BMI ≤ 29.9 THEN non diabetic.
- R3: IF Plasma glucose concentration > 127 AND BMI > 29.9 THEN diabetic.

Rule 1 takes the decision on the basis of only plasma glucose concentration of the patient while rules 2 and 3 are contradictory with each other deciding non diabetic and diabetic respectively based on both features. The above process is again repeated after presenting training and testing samples of breast cancer data one by one using C4.5 model and generating a DT with 15 levels and 8 leaves as two classes: Benign and Malignant. These 8 leaves generates following eight rules with only three features and producing highest accuracy of 95.91%:

- R1: IF UCS ≤ 2 AND BN ≤ 3 Then Benign
- R2: IF UCS ≤ 1 AND BN > 3 AND NN ≤ 2 Then Benign
- R3: IF UCS > 1 AND BN > 3 AND NN ≤ 2 Then Malignant
- R4: IF UCS ≤ 2 AND BN > 3 AND NN > 2 Then Malignant
- R5: IF UCS ≤ 3 AND BN ≤ 2 THEN Benign
- R6: IF UCS > 3 AND BN ≤ 2 THEN Malignant
- R7: IF UCS ≤ 4 AND BN > 2 THEN Malignant
- R8: IF UCS > 3 THEN Malignant

Applying feature selection technique is beneficial in terms of accuracy produced by the models in case of both the data sets in health care diagnosis process. A DSS with reduced set of features can improve the performance of the system while on the other hand it is also beneficial for the patient in terms of the number of tests required to diagnose the disease.

Feature ID	Accuracy	Sensitivity	Specificity	Precision	F-measures
B,F,H,A,E,G,D,C	76.57	75.0	77.34	61.68	67.69
B,F,H,A,E,G,D	76.57	75.0	77.34	61.68	67.69
B,F,H,A,E,G	76.57	75.0	77.34	61.68	67.69
B,F,H,A,E	76.20	75.0	76.79	61.12	67.34
B,F,H,A	76.20	75.0	76.79	61.12	67.34
B,F,H	77.32	67.04	82.32	64.83	65.92
B,F	78.43	71.59	81.76	65.62	68.47

Table 6: Measure after applying feature selection on breast cancer data set					
Features Rank	Accuracy	Sensitivity	Specificity	Precision	F-measures
I,F,C,G,D,H,J,E,B,A	95.10	97.38	91.30	94.90	96.12
I,F,C,G,D,H,J,E,B	95.10	94.90	95.45	97.38	96.12
I,F,C,G,D,H,J,E	95.10	94.90	95.45	97.38	96.12
I,F,C,G,D,H,J	95.10	94.90	95.45	97.38	96.12
I,F,C,G,D,H	95.10	94.90	95.45	97.38	96.12
I,F,C,G,D	95.10	94.90	95.45	97.38	96.12
I,F,C,G	95.10	93.63	97.72	98.65	96.07
I,C,G	95.91	94.26	98.86	99.32	96.73

CONCLUSION

Diagnosis of life threatening diseases by utilizing intelligent techniques like data mining is very common and powerful and can be verified with decisions taken by expert physician. This can be also beneficial for the medical students to check and enhance their expertise in this domain. This paper presents and explores the process of developing rule base with reduced and improved set of feature subset using various DT based techniques: ID3, CART, C4.5, CHAID and QUEST. Experimental work is performed through WEKA open source data mining software with two health care data sets: diabetes and breast cancer. A ranking based feature selection technique has produced best feature subset with only two (Plasma glucose concentration and Body Mass Index) and three (UCS, BN, NN) features respectively for diabetes and breast cancer data set. Further, this data is presented to the C4.5 model to generate rule base. DT has generated three rules in case of diabetic data producing 78.43% accuracy, 71.59% sensitivity, 81.76% specificity, 65.62% precision, and 68.47% F-measure, while eight rules are generated for breast cancer data producing 95.91% accuracy, 94.26% sensitivity, 98.26% specificity, 99.32% precision and 96.73% F-measure. It can be noted that performance of models are improved as compare to all features (Accuracy 76.57% in case of diabetes and 95.10% in case of breast cancer) for both data sets. Higher performance of models in the case of 2 and 3 features will be beneficial for the patient since it do not require many risky, uncomfortable and expensive medical tests. The results obtained in this research work are either similar or superior to those obtained by many authors in the literature. In the future, these rules can be utilized to develop a DSS to assist physicians and medical students.

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ENGRAFTING ENTREPRENEURIAL EDUCATION AND INFORMATION COMMUNICATION TECHNOLOGY IN THE SCHOOL CURRICULUM FOR SUSTAINABLE CAREER CREATION

Adeniran G Adewusi , Lagos State University, Ojo, Nigeria (gregade2000@yahoo.com)
Samuel Akinyemi, Lagos State University, Ojo, Nigeria (akinyemisam2006@yahoo.com)

ABSTRACT

The paper examines the need for Entrepreneurial consciousness and Information Communication Technology (ICT) compliance crucial to the 21st century youth to successfully explore the global economic environment. It is becoming more imperative in the face of mass unemployment that many countries especially the developing ones need to restructure the school curriculum to meet the social economic needs of the upcoming young ones. The era of the young Nigerian school leavers, especially university graduates dreaming to secure collar jobs with their certificates and earning salaries is no longer automatic. The school curriculum, with a content reload that accommodates the development of application of an enterprising mindset and skills in specific contexts of turning ideas into economic power and reward is subscribed. The crux of this paper rests on how curriculum under the instrumentality of the school can turn the table around for sustainable job creations taking cognizance of the present lack of intellectual economic property. The role of Information Communication Technology (ICT) is crucial to the acquisition of entrepreneurial skills as the contemporary world is now a global economic environment fast explored via digital access to information using ICT. This paper therefore conceives ICT as panacea to human social economic problems, major shift in the way people live, teach, learn, disseminate and acquire information. ICT no doubt, is shaping the new global economy and producing rapid changes in the society. It is positively producing significant transformation in industry, agriculture, medicine engineering and of course in the business world. The paper further recommends how ICT can aid Entrepreneurial Education in producing a seasoned and well informed entrepreneur in the digital age if the subject matter is entrenched in the curriculum.

Keywords: *Entrepreneur, Entrepreneurial Education, Information Communication Technology, Career, Curriculum.*

INTRODUCTION

Going by the socio-economic realities of our contemporary times, every developing country Nigeria inclusive should take a decisive step at combating the problem of unemployment of the teeming youth who after graduation from schools cannot get employed not because they were not educated but simply because they got training that could not get them employment hence they are unemployable. Globalization, Information and Communication Technology (ICT) and Entrepreneurship are becoming three major issues considered to be crucial in the development of the child, important in nation worldwide and influencing the contemporary world of knowledge. In the aspiration for identification with contemporary development globally, it has become inevitable for Nigeria to incorporate relevant content into the school curriculum.

Governor Babatunde Raji Fashola of Lagos State, Nigeria and Professor Pat Utomi also a Nigerian, have joined other stakeholders in the education sector in calling for the inclusion of entrepreneurship education curriculum in the country. They both agreed that in repositioning Nigerian Education for National Transformation, entrepreneurship and human capital development must be put in place to solving unemployment problem in the country.

According to the Lagos state Governor (as cited in Adesulu,2012):

It is urgent for us as a nation to tilt our curriculum towards entrepreneurship education in order to achieve national transformation. While we cannot shy away from the need for proper understanding of ICT, Science and the likes, we must also understand the fact that, it is only a creative mind that can turn things around for the development of our nation. The best economies of this world cannot shy away from entrepreneurship education as a means of solving unemployment and reducing to the barest minimum, the reliance on the non-existent white collar jobs that most of our graduates and youths are searching for today. Most of the successful conglomerates in Nigeria are not owned by professors or academics, but by those who dared to be different by veering into entrepreneurship.

The Governor of Lagos State (as cited in Adesulu,2012) also opined that over the years, Nigerians had laid so much emphasis on academics and university education, the resultant effect of which had led to producing graduates who became unemployable, not because they were not educated but because they could not express their God-given talents combined with the education they had hence could not make a living for themselves and help their society to grow. According to the Governor, the system of education had produced more frustrated youths who despite their qualifications could not find jobs to earn a living and as a result, homes kept breeding more overgrown babies who by every standard should be bread winners in their own right.

Nigeria is a blessed country in human and material resources, all that is needed and will be needed for us to transform the country is placed at our disposal, and it will only require our political will and determination to make us achieve our aim of making Nigeria a great nation of our dreams.

The six drivers of growth in a nation's economy which include entrepreneurship, human capital, culture, leadership, policy choice, and institutions must be harnessed to have a balanced system work in the ICT epoch. Education is not where you go and get a certificate but where you shape the human mind. With this background, policy makers of education should come up with an encompassing curriculum that can usher the Nigerian youths to a sustainable job creation, taking cognizance of the indispensability of ICT. At this juncture, Nigeria should see the desiderata to emulate the American approach of job creations using education policy that is pragmatic in nature or else the unemployment crisis will continue to mount and this may create further socio-political enigma which might be very difficult to contend with due to the fact that the crops of educated unemployable youths may be employed in advanced and sophisticated internet crimes, and other ill-practices, which already are gaining momentum among the youths in Nigeria and some developing countries in Africa.

Nigerian Graduates - No Jobs!



Figure 1. Why graduates of Nigerian lack jobs, Source: Adapted from Essia, 2010).

CONCEPT OF ENTREPRENEURSHIP EDUCATION

Entrepreneurship Education denotes all forms of knowledge delivery that seeks to empower the individual to create wealth in the economic sector, thereby advancing the course of development of a nation as a whole (Ekpoh & Edet, 2011). According to Awabil and Bediako in Ekpoh & Edet (2011), the goals of entrepreneurship education is to empower graduates irrespective of their area of specialization with skills that enable them to engage in income yielding venture, if they are unable to secure jobs in the public sector. It is a reorientation from job seekers to job creators. The figure above shows a clear picture of why unemployment is so rampant among the Nigerian youth of today.

Deakins D & Free .M in Adewusi (2012) conceptualized Entrepreneurship education as more of an individual ability to turn ideas in to action. This covers creativity, innovation and risk taking and the ability to plan and manage projects in order to achieve objectives. It lends supports to every individual day-to-day life, at home and the society, making employees more aware of the context of their work and better able to seize opportunities and provide a foundation for entrepreneurs setting up social or commercial activities.

According to Ogalanya in Nwabuona (2004) identified entrepreneurial skills to include managerial or administrative skills, job/technical skills, human relations skills, innovative/enterprising skills, competitive skills, communication skills, conceptual/planning skills, supervisory/guidance skills, according skills, investigation/problem solving skills. Ohakwe (2003) observed entrepreneurial skills as banking transactions, internet concepts and skills, internet websites knowledge and skills. Ohakwe, further affirmed that an adequate knowledge of these concepts, skills and internet competences certainly is an asset to technology and vocational education graduates in today's ICT driven world. The Nigeria system of education should develop a curriculum plan to accommodate the aforementioned skills in order to reorient ate the thinking of Nigerian youths towards creating a sustainable job.

ICT A CATALYST FOR ENTREPRENEURSHIP

The Information communication technology (ICT) is a fast growing new technological era. The ICT is entering fast in Nigeria both in education and in the job market but still in its infancy. The ICT has opened global job market where people with competence can do jobs sitting in their own house anywhere in the world without going to or attending the work place (Alam, 2009). The development of ICT and new technologies including the use of the internet is catalytic to delivery of quality education. An enabling environment to be provided for, should include an ICT policy for education, provision of infrastructure such as stable electricity, security, affordable internet connectivity and computer lab in schools of educational institutions (Okebukola,2010).

(UNDP, 2001) observed Marketing New Technologies Work for Human Development, more information can be sent over a single cable in a second than in 1997 was sent over the entire internet in a month. It also observed that the cost of transmitting a trillion bits of information from Boston to Los Angeles has fallen from US\$150,000 in 1970 to 12 cents today. Individuals with technical and vocation skills and good knowledge of ICT are characterized by self-reliance, self employment and fit properly into today's technical, entrepreneurial and business world. The entrepreneur should therefore possess technical skills, ideas and management skills which are necessary for the success of the venture. One of such skills is information and communication technology which is characterized by employee empowerment and involves the making of unskilled and semiskilled workers to be skilful and functional in today's world of work. It also involves the development of task oriented team of workers who no longer depend on individual managers for all their decisions to achieve targets. Egbowon & Akindoju (2012) espouse that ICT is generally misconstrued for computer or computer application but in the real senses, the development brought about by the convergence of technologies which is now a commonplace in digital cameras, mobile phones, the opening of internet through personal web space and other services are integrated into a single box sitting on a user's desktop which today's learners or teachers can harness for education. This convergence is what makes computer the focal point of Information and Communication Technology.

Technology education is to be considered as the key agent of technology development, either as a way of developing human capacity, increasing the shield work force for modernization, industrialization, environmental

development or as a matter of personnel freedom, developing capability and empowerment. Decision makers at all levels, need timely, reliable access to knowledge generated by technology and technical education to introduce rational policies that reflect a better global understanding of complex technical, economic, social, cultural and article issues concerning the society, and our environment. Technical decision making and priority setting is an integral part of overall development planning and formation of technology development strategies. Above all, technology education is a human right and, as such, should receive priority in the allocation of national resources. It has become very necessary not to only keep technology education bound to the role of manufacturing skilled manpower but also to economic development and global economy (Alam, 2009).

In Nigeria, technology education was previously not seen as fundamental for national development, or for the economic development, but for the school dropouts, and other social and political development within the nation and for individuals. Hallak (1990) advanced that technology education is also linked to human resources development and that this has an impact on more than just economic growth, but also an impact on the wider development of individuals and societies. According to him, it contributes to:

- (a). Individual creativity, improved participation in the economic, social and cultural roles in society.
- (b). Improved understanding of an individual and their respect for others, thus promoting social cohesion and material understanding
- (c) Improvement in health and nutrition.
- (d). Improved chances of economic development.
- (e). Improved technological development.
- (f). Socio-cultural change.
- (g). Democracy and equality
- (h). Ecological development/quality of life (increasing people's awareness of their environments).

From the analysis so far, it is clear that modernization and economic development, depends on investment and appreciation of modern trends in technology education. According to Woodhall (1997) investment in technology education and training produces benefits for the individual and for society as whole.

Going by the characteristics of ICT, an entrepreneur ICT compliant gets leverage over a non ICT compliant entrepreneur who does not have any knowledge of the following; Increased and improved access to information, Improved quality of instruction, Mass education, Improved access to research materials, Improved teaching and learning process, Enhancement of quality instruction, Reduction in the time to complete a task, Combine media for presentation, Store and quick access to large amount of information, Exchange ideas with others at both near and distant locations, Immediate, concrete and real feedback mechanism, The ICT techniques will enhance advertising, public relations, personal development and commercial venture. Anyanwuocha (2001) observes that the entrepreneur is the chief co-coordinator, controller and organizer of the production process. The entrepreneur combines other factors of production (land, capital and others) in such a way as to obtain maximum production of goods and services at minimum costs. In order to effectively enhance occupational skills in the present day, entrepreneurs need no doubt, acquire information and communication technology knowledge and skills.

RECOMMENDATIONS

Entrepreneurial education should be invested in at some levels of education (secondary and tertiary). ICT education should be conceived as an integral part of the school curriculum as the 21st century epoch cannot afford to accommodate ICT illiterates. Students should be educated and trained with the aim of inculcating in them entrepreneurial skills that can combine ICT techniques to explore and create job opportunities rather than being job seekers irrespective of the knowledge they acquire in school. Computer Studies /literacy should be made compulsory and a pre-condition for graduation in teacher education programmes. In order to sustain the culture of reform, the ICT curriculum should undergo systematic and strategic transformation to ensure integration of technological innovations in education. Policy of education must shun just mere fortification of people with titles but entrepreneurial and ICT education that works.

CONCLUSION

Entrepreneurial education along with ICT education must be seen as the immediate panacea to solving the present perennial unemployment challenges of teeming youths. Nigeria and other developing countries should tap from America and some advanced countries in entrepreneurial and ICT pragmatic approach of creating sustainable job life.

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OPTICAL INTERCONNECTED MULTICORE/MANYCORE SYSTEM ARCHITECTURE FOR FUTURE BIG DATA APPLICATIONS

Lei Zhang, University of Maryland Eastern Shore, USA, lzhang@umes.edu
Ting Hu, Zhejiang University, China, huting@zju.edu.cn
Xianfang Tan, University of Nevada, Las Vegas, USA, tanx@unlv.nevada.edu

ABSTRACT

This paper presents a fully connected optical Network-on-Chip (ONoC) architecture for the interconnection in multicore systems. The architecture is based on the Micro-Ring Resonator (MRR). MRR is a ring structure silicon waveguide that can switch optical signal via resonating. Each MRR is designed to switch signals only in a particular routing wavelength. The architecture design scheme, wavelength assignment and routing algorithm are provided in detail. In this architecture, different cores in the network can communicate to each other in Wavelength-Division-Multiplexing (WDM) simultaneously without any conflict, which is especially suitable for handling the intensive data traffics in Big Data applications. As an example, a 4×4 optical chip has been fabricated and presented which offers 16 concurrent photonic channels (up to 25Gbps) running on 4 different wavelengths. Experiment results have shown the many eminent properties of the silicon based optical NoC architecture, as the solution to meet the future Big Data HPC requirements.

Keywords: Network-on-Chip (NoC), Optical Switch, Wavelength Routed Optical Network (WRON), Recursive Wavelength Routed Optical Network (RCWRON)

INTRODUCTION

Big Data is an emerging term used to describe operational challenges of today's growing data sets collections that are too big and complex to store, analyze and understand. As of 2012, limits on the size of data sets that are feasible to process in a reasonable amount of time were on the order of exabytes of data. Scientists regularly encounter limitations due to large data sets in many areas, including meteorology, genomics connectomics, complex physics simulations, and biological and environmental research [1, 2].

The key to handle Big Data issues stands on the high performance computing (HPC) multicore/manycore platforms. However traditional metal based interconnection among computing cores is acting as the bottleneck with intrinsic limits on bandwidth transmission delay, electromagnetic interference (EMI) and energy consumption. On-chip silicon based optical interconnection offers extremely high bandwidth with no EMI, negligible transmission delay (light speed) and extremely low energy consumption. It is widely accepted to be the most promising candidate to take over the metal wire in connecting cores, especially in construction the next generation HPC multicore/manycore systems.

Optical/photonic networks-on-chip (ONoCs) are emerging as a new paradigm to interconnect a large number of processing cores at chip level, meeting the pressing demand for extremely high bandwidth and low power consumption. The recent advances in nanoscale silicon photonics and development of silicon photonic devices [3-6] have made optical NoC a promising and viable solution to meet the ever increasing chip-level interconnects challenges. The central part of an optical NoC (ONoC) system is the on-chip photonic interconnection network which is composed of silicon waveguides and optical routers. An optical router is generally built upon waveguides and optical switches. Of the many available optical switches, micro-ring resonator (MRR)-based optical switches are typically preferred due to their ultra-compact size, simple-mode resonances, and ease of phase-matching between an MRR and its coupling waveguides [7].

The heart of a optical interconnection network is composed of silicon waveguides and optical switches [8]. Micro-ring resonator (MRR)-based optical switches are typically preferred in such application due to its ultra-compact size (3-10 μ m diameter), simple-mode resonances and ease of phase matching between the MRR and the

coupled waveguides. The input light is only coupled through the switch on the straight direction (i.e., switched) if the input wavelength λ_i equals the resonating wavelength λ_r , where λ_r is defined by

$$m\lambda_r = n_{eff}L \quad (1)$$

In Eqn. (1), m is any integer number, L is the cavity of the ring, and n_{eff} is the effective index of the optical mode. Fig. 1 illustrates the MRR-based switch which is designed based on this principle.

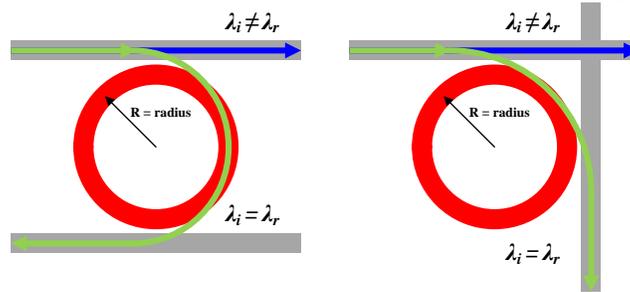


Fig. 1. Micron-Ring Resonator Optical Switch

MRR BASED ON-CHIP OPTICAL NETWORK

By the use of the MRR optical switch, the GWOR network [9] can be built to interconnect cores to an Optical Network-on-Chip (ONoC). Fig. 2 shows a 4×4 GWOR network which can be used to interconnect 4 cores.

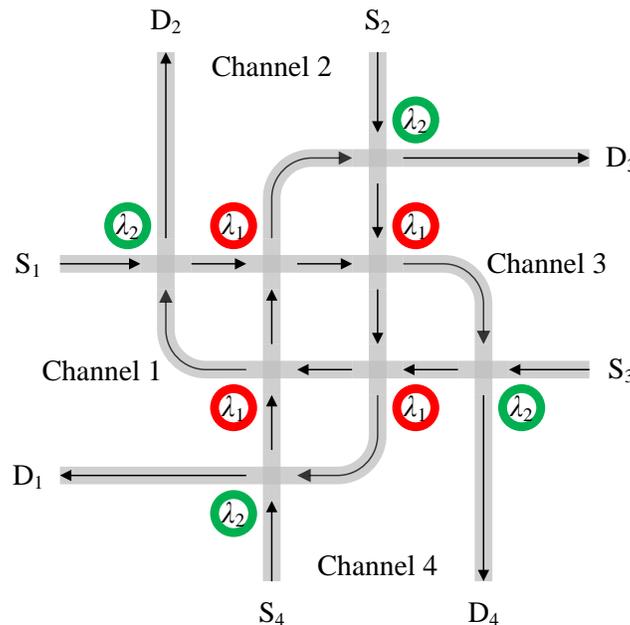


Fig. 2. MRR based 4×4 Optical Network

As shown in Fig. 2, the network has 4 source ports (S) and 4 destination ports (D) that can be used to connect 4 cores to transmit and receive optical signals. The network is comprised of 4 intersected waveguides and 8 MRRs. The 8 MRRs are fabricated with 2 different resonating (routing) wavelengths, λ_1 and λ_2 .

By the use of Wavelength-Division-Multiplexing (WDM), simultaneous communications can share optical channels without any conflict in the network. On maximum, every core can communicate to all other cores on the same moments. In another word, the network can support totally 12 concurrent communications in which every

core hosts three communications to different receivers. Three different routing wavelengths are required for these three WDM communications, λ_0 , λ_1 and λ_2 , in which λ_0 is any wavelength other than λ_1 and λ_2 . And these three routing wavelengths can be reused for the communication of every core. The routing wavelength truth table of the network is given in Tab. 1. For example, as shown in the 2nd row, 3rd column, λ_2 is wavelength that can be used for transmit optical signal from port S_1 to port D_2 .

Tab. 1. Routing Wavelength Truth Table

Wavelength	D_1	D_2	D_3	D_4
S_1		λ_2	λ_1	λ_0
S_2	λ_0		λ_2	λ_1
S_3	λ_1	λ_0		λ_2
S_4	λ_2	λ_1	λ_0	

FABRICATION

The chip is fabricated in the Institute of Microelectronics, Singapore. Chip layer definitions are listed in Tab. 2.

Tab. 2. Layers Definition

Layer No.	Description	Field
1	Waveguide - Rib	Dark
2	Waveguide - Grating Couplers	Clear
3	Waveguide - Slab	Dark
4	MOD+PD - Si P++ implant	Clear
5	MOD - Si N++ implant	Clear
6	MOD - Si Implant P	Clear
7	MOD - Si Implant N	Clear
8	PD - Si P+ implant	Clear
9	PD - Ge epi	Clear
10	PD - Ge N++ implant	Clear
11	PD - Ge P++ implant	Clear
12	Thermal Heater - Metal 2	Dark
13	Via 1 - MOD + PD	Clear
14	Via 2 - Heater	Clear
15	Metal 1	Dark

Fig. 3 shows the overview of the fabricated optical silicon chip. The location of the 4x4 network is marked with yellow dashes in the figure.

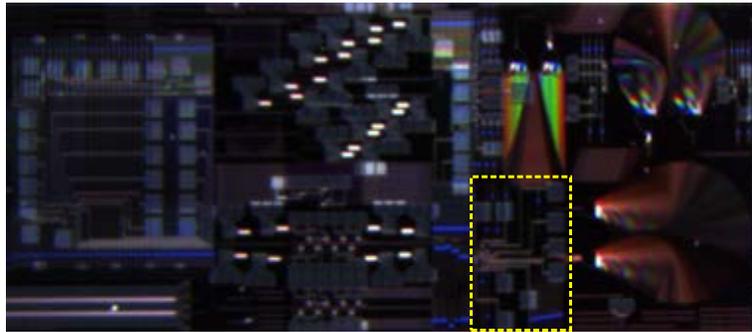


Fig. 3. Overview of the Silicon Optical Chip

Fig. 4 shows the photo of the 4×4 Optical Network.

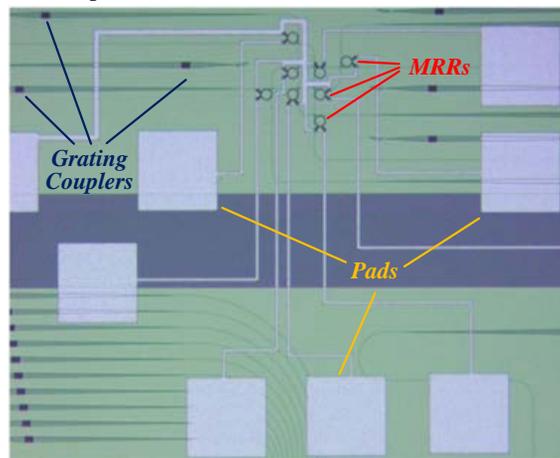


Fig. 4. 4×4 On-Chip Optical Network

As shown in Fig. 4 , grating couplers are integrated to couple light into and out of the network. A 1.5- μm -thick SiO_2 layer is deposited on the Si core layer. Then a 120-nm-thick TiN is sputtered on the SiO_2 layer and TiN heaters are fabricated. Copper wires (10 μm wide) connect the TiN heaters and the 100 μm ×100 μm pads. The MRR height is 220nm, width is 450nm, diameter is 20 μm , and the distance between the MRR and the waveguide is 200nm. All MRRs are made to be in the same size. Later they will be thermally tuned by applying current on the TiN heater to be in different resonating wavelengths.

THERMAL CALIBRATION

According to Eqn. 1, the key that an MRR will work on a designed resonating wavelength is the cavity (L) of the ring. However, since the current fabrication technology ($\sim\text{nm}$) cannot meet such precision requirement, the thermal calibration of each MRR is required to tune its resonating wavelength.

The thermal tuning of MRR is implemented by applying current on the TiN heater under every MRR. The n_{eff} (effective index of the optical mode of the MRR) in Eqn. 1 will change in different temperatures. Fig. 5 shows the such tuning of the MRR resonating wavelength. It can be seen when there is no current applied the MRR resonating wavelength is around 1542nm. When 7.62 mA is applied it resonating wavelength is tuned to be on 1543.5nm, and to be on 1545.4nm when 17.14mA current is applied.

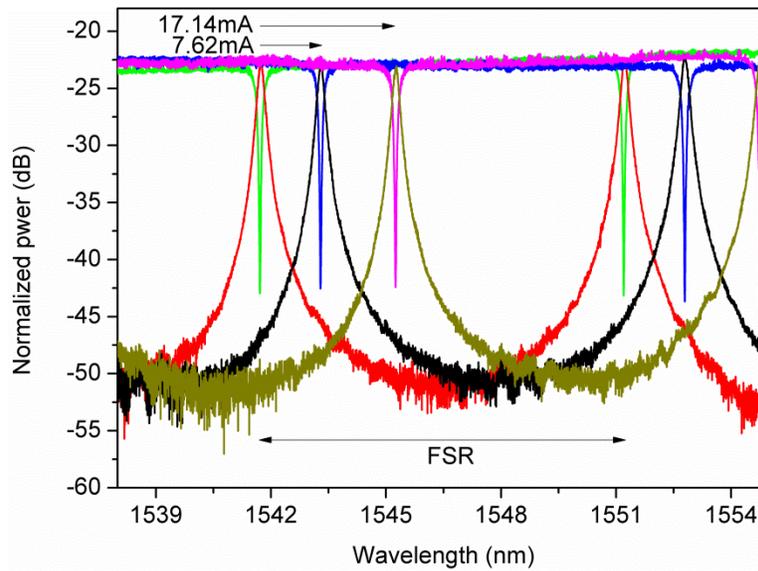


Fig. 5. Thermal Calibration of the MRR Switch

Each MRR in the network is thermally tuned to expected resonating wavelength by applying proper current, to fulfill its designed function of switching optical signal depending on its wavelength.

EXPERIMENT

To develop the optical interconnected multicore system, the first step is to validate the optical on-chip network. In our experiments multiple SFP+ modules are used to mimic different cores. Each SFP+ module is working in a predetermined routing wavelength according to Tab. 1. Optical signal generated from SFP+ modules are injected from fibers to on-chip grating couplers. The testbed system diagram is shown in Fig. 6.

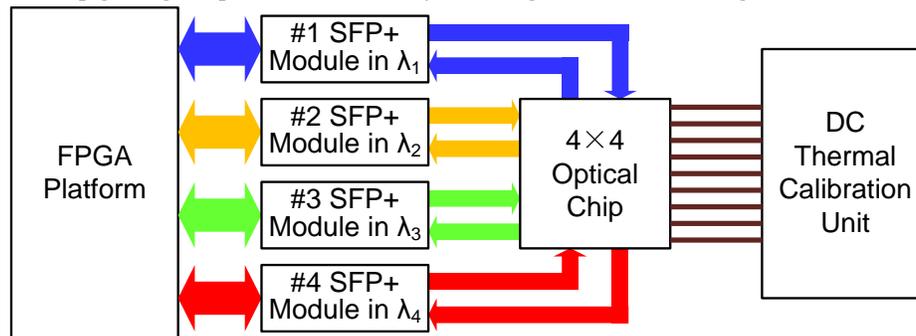


Fig. 6. Optical interconnect chip testbed system diagram.

Fig. 7 shows the optical testbed we assembled in testing the optical system, and Fig. 8 shows the positioning of optical fiber tips to gratings on the chip to inject and derive optical signals.

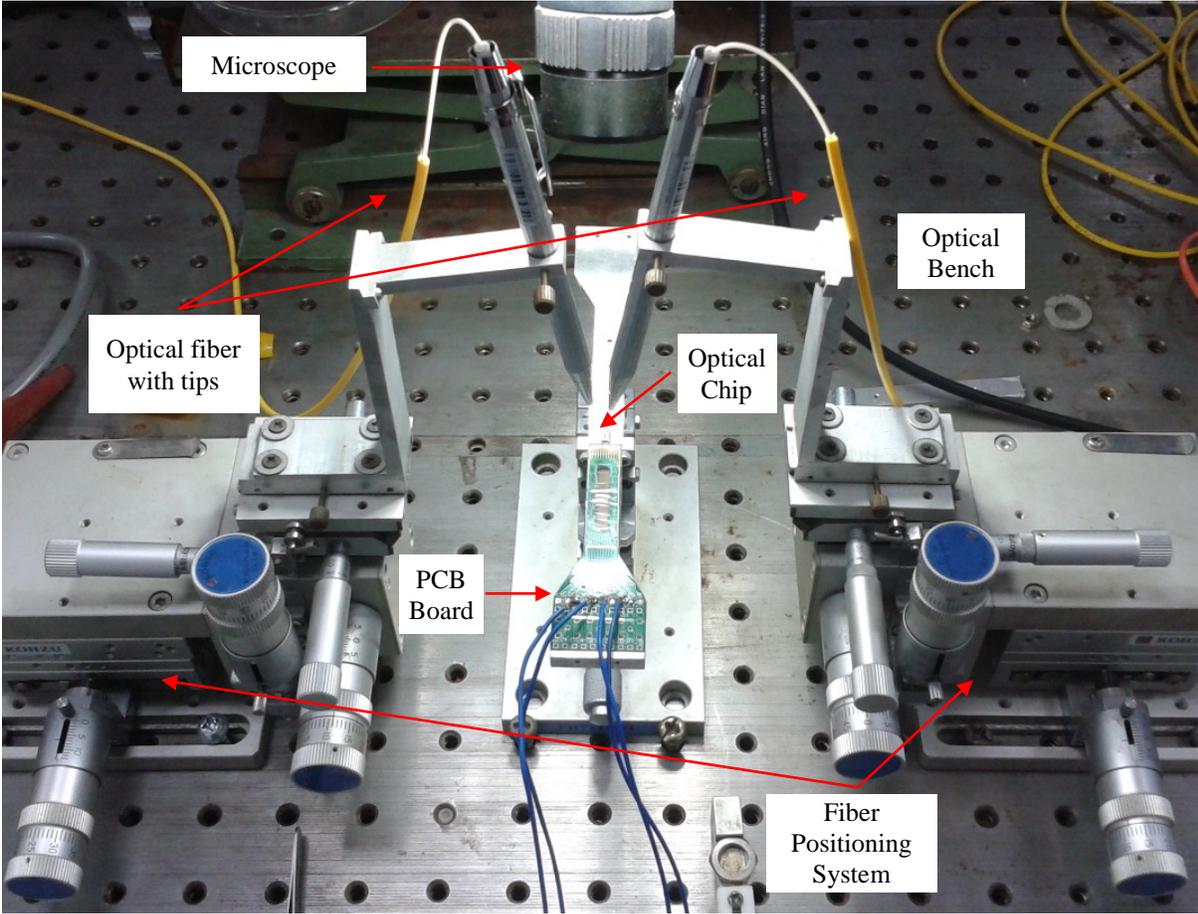


Fig. 7. Configuration of the optical testbed.

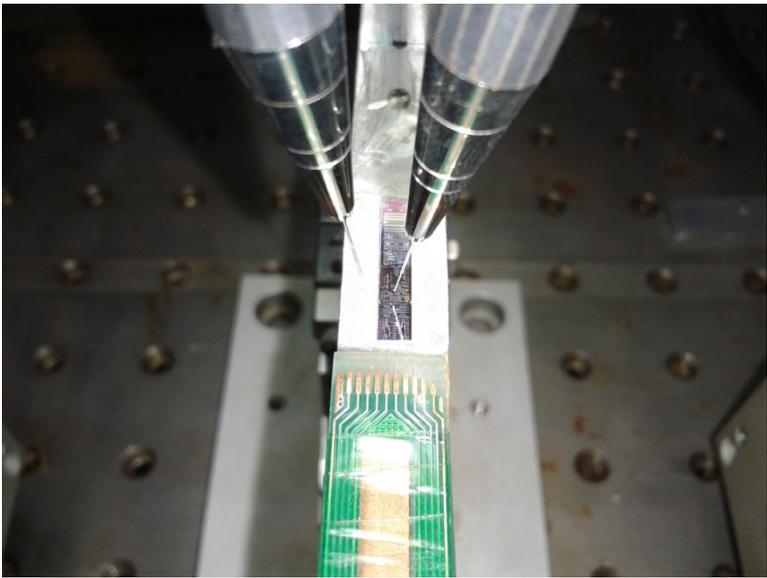


Fig. 8. Positioning of optical fiber tips to gratings on the optical chip.

Experiment result shows that the fabricated optical chip can successfully support multiple simultaneous optical communications between different source and destination ports. The SFP+ modules are working on the rated speed as 10Gbps to communicate to each other, by which on maximum the data throughput on the network can reach $12 \times 10\text{Gbps} = 120\text{Gbps}$.

CONCLUSION

In this paper we presented a traditional CMOS technique based optical on-chip interconnect network that can be used for constructing future multicore Network-on-Chip, to provide the extremely high computational capability required by Big Data applications.

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A STUDY ON MEASURING THE PERFORMANCE EFFICIENCY THE SIXTEEN PRIVATE BANKS OF INDIA USING DATA ENVELOPMENT ANALYSIS

P. Mariappan

Research Supervisor in Management Science
Bishop Heber College
Tiruchirappalli-620017 Tamil Nadu India
E-mail: mathmari@yahoo.com

S. Chandra

Retired Professor of Mathematics and Former Controller of Examinations
SCSVMV University
Kanchipuram Tamil Nadu India

G. Sreearthi

Research Scholar in Management Science
Bishop Heber College
Tiruchirappalli-620017 Tamil Nadu India

K. Maanvizhi

Research Scholar in Mathematics
Bishop Heber College
Tiruchirappalli-620017 Tamil Nadu India

ABSTRACT

The aim of this research work is to evaluate the performance of the sixteen Private Banks of India. For this study the researcher collected the data from 2007 to 2012 and evaluated using Data Envelopment Analysis (DEA). DEA, mainly, takes into account the input [eleven variables] and output [six variables] gears of a Decision Making Unit (DMU) to evaluate their performance. The measure of performance lies in the range 0 to 1. The outcome of this analysis reveals that:

- ✓ *City Union Bank is relatively efficient based on the input oriented technical efficiency [CRS].*
- ✓ *Five banks are relatively efficient based on the input oriented technical efficiency [VRS].*

Key Words: *Data Envelopment Analysis, Decision Making Unit, Performance, Efficiency, Constant Return to Scale, Variable Return to Scale*

1.0 INTRODUCTION

It is one of the main activities of any firm to monitor its efficiency. In the current scenario there are a number of methods based either on the traditional approach or using IT to evaluate the efficiency of a system. Efficiency measurement methods can be divided into three main categories: ratio indicators, parametric and nonparametric methods. In selecting indicators to measure efficiency one can focus primarily on a firm's inputs and outputs. In general, the term productive unit refers to a unit producing certain outputs by spending certain inputs. The evaluation of efficiency in production units and determining the sources of their inefficiency is a precondition to effectively improve the performance of any such unit in a competitive environment. Bank[s] branches can be considered as production units too. In general, they are homogeneous units performing similar activities. All inputs and outputs have an impact on the efficient operation of such units, even though some are relatively considered to be more important or less important to each other.

Scheduled Banks in India are those banks which have been included in the Second Schedule of the Reserve Bank of India (RBI) Act, 1934. RBI in turn includes only those banks in this schedule which satisfy the criteria laid down vide section 42 (6) (a) of the Act. Performance is normally referred to as the bank's ability to generate transaction by effectively utilizing its resources. Based on the economical term, efficiency refers to the ratio of outputs to inputs. Input refers to the scarce resource and output in terms of goods and services offered to the consumers. One can understand the notion of efficiency in terms of banking operation as more consequential as the banking sector is deemed to play a vital role in the financial division of a country. The banking sector of a country is one of the most important sectors of the country's economy. Hence, it is highly essential to measure its performance using the proper tool. Usually, the performance is measured with the help of Financial Management tools like, Return on Assets [ROA], Return on Investments [ROI], Return on Equity [ROE], Equity to Assets [ETA] and Internal Growth of Equity [IGE], etc. These measures are lacking in the sense that they are not total productivity measures but are partial productivity measures. As a blessing in disguise Data Envelopment Analysis (DEA) came to the rescue. It is considered as a tool for measuring total productivity. That is, one can mix all the inputs and outputs to study the effectiveness of any type of organization.

The large numbers of commercial banks in India, their high branch density, the quick technological change and the increased competition have added more pressure to improve performance. Instead of studying a bank's partial productivity, with the available Financial Management Tool like Ratio Analysis, it is the order of the hour to study the total productivity. In this context, the author has introduced the concept of DEA model in this research paper. This system has the benefit of developing a data-driven technological frontier that necessitates no specification of any scrupulous functional shape or error structure. This study fills the gap in the literature by leaving from the traditional method of evaluating the efficiency of a bank.

Private-sector banks have been functioning in India since the very beginning of the banking system. Initially, during 1921, the private banks like bank of Bengal, bank of Bombay and bank of Madras were in service, which all together formed Imperial Bank of India. Reserve Bank of India (RBI) came in picture in 1935 and became the centre of every other bank taking away all the responsibilities and functions of Imperial bank. Between 1969 and 1980 there was rapid increase in the number of branches of the private banks. In April 1980, they accounted for nearly 17.5 percent of bank branches in India. In 1980, after 6 more banks were nationalised, about 10 percent of the bank branches were those of private-sector banks. The share of the private bank branches stayed nearly same between 1980 and 2000. Then from the early 1990s, RBI's liberalization policy came in picture and with this the government gave license to a few private banks, which came to be known as new private-sector banks. There are two categories of the private-sector banks: "old" and "new". The old private-sector banks have been operating since a long time and may be referred to those banks, which are in operation from before 1991 and all those banks that have commenced there business after 1991 are called as new private-sector banks. Housing Development Finance Corporation Limited was the first private bank in India to receive license from RBI as a part of the RBI's liberalization policy of the banking sector, to set up a bank in the private-sector banks in India.

1.1 STRUCTURAL FRAMEWORK

The main aim of this research study is to validate the implication of DEA in investigating and examining the efficiency of sixteen private banks out of eighteen private Banks of India.

DEA was first introduced by (Charnes et al., 1978) as a Mathematical Programming Model with the help of the theoretical frame work given by (Farrell, 1957), for computing the relative efficiencies of multiple Decision Making Units (DMUs), and it falls under the special category of Fractional Programming. DEA is a special technique which offers a comparative ratio for each unit in terms of output and input. The ratio is stated as efficiency score for each unit. The measure of performance lies in the range 0 to 1. If the performance measure is 1 then the organization is considered to be highly efficient and if the measure is tending towards 0, the efficiency is otherwise. One of the significant roles of DEA is that the efficiency scores indicate the gap for potential

improvements and developments for inefficient DMUs. One more positive point of DEA is that this technique does not have any rigid or predetermined structure in defining the efficient units (Banker, 1984; Al-Faraj et al., 1993; Burley, 1995; Mester, 1996).

DEA firstly applied by Sherman and Gold (1985) for assessing the efficiency of bank branches, is a tool for evaluating relative efficiency since it first identifies the bank's efficiency frontier and then compares it with other banks. It allows ranks to be awarded to the banks according to their technical efficiency scores and also to single out the driving forces for inefficiencies. In the banking industry, the DEA model is preferable to an econometric approach of efficient measurement because it has a number of advantages. There are:

- ✓ It can simultaneously analyze several inputs and outputs, which is an alternative characteristic, because production in the banking industry often involves multiple inputs and outputs.
- ✓ It does not require any assumptions about the functional form of technology, and
- ✓ It calculates a maximal performance measure for each production unit relative to all other production units in the observed population with the sole condition that each production unit lies on or below the external.

This paper differs entirely from all other previous works by investigating and examining the current performance of the Private Banks of India individually, in terms of their efficiency for the period [2007 – 2012] using the Data Envelopment Analysis (DEA). This study classifies the private banks into two categories as efficient and inefficient. The remedial measures are discussed in order to improve the efficiency of the banks.

1.2 OBJECTIVES

The researcher's main intention is to classify the Scheduled Commercial Banks (Private Banks) of India in terms their efficiency using BCC and CCR models of Data Envelopment Analysis (DEA) and the measures to improve the efficiency of the Banks.

2.0 REVIEW OF LITERATURE

The Financial Management Tool known as Ratio Analysis Technique [RAT] has been used for many years to evaluate the performance of the Banks. The financial statements are examined to find different ratios and then compare them with the defined Benchmark. In this research paper, the traditional parametric technique is replaced with the non – parametric method DEA to investigate the performance of the Banks.

(Seiford and Zhu, 1999) examined the profitability and marketability of the top 55 U.S. commercial banks by applying the DEA model and concluded that large banks performed better with respect to profitability than small size banks, while small size banks have the better characteristic of marketability as compared to large size banks.

(Maudos et al, 2002) studied the cost and profit efficiency of 832 European banks based on ten European Union Countries (period 1993 – 1996). The return on assets (ROE) and return on equity (ROA) were acquired as performance measures to check profit efficiency of banks using DEA. This study was made based on the four dimensions namely the market characteristics, differences in size, other bank characteristics and specialization. Variations in profit terms were found to be greater than the variations in cost terms.

(Park and Weber, 2006) tested the profitability of all Korean banks by testing with (traditional hypothesis approach) market structure hypothesis against efficient structure hypothesis applied after examination of the panel data (for the period of 1992-2002); with the help of (DEA) model. The outcome of this study shows that the performance measures significantly affects the profitability of banks. (Pastor, Lovell, and Tulkens, 2006) discussed the financial performance of branch offices. They studied 573 branch offices, for a six-month accounting period, of large European savings banks. Data Envelopment Analysis (DEA) and Free Disposal Hull (FDH) programming mathematical models were used to estimate financial performance with respect to their

safeguard against expenses in giving customer services and building customer bases. They concluded that the financial performance evaluation factors can be reduced without statistical loss of significant information to the bank management.

(Sufian, 2009) studied the efficiency of the Malaysian banking sector during the Asian Crisis of 1997 for the period of 1995-1999. The efficiency of individual banks was computed by DEA technique. They considered the Profitability as the major ingredient which was used to evaluate the efficiency with other explanatory variables, like bank size and ownership. The outcome of this study indicated that as there is a positive association between the Efficiency of banks and loans intensity and the relationship is otherwise for the economic conditions and expense preference behavior. (Izah Mohd Tahir, Nor Mazlina Abu Bakar and Sudin Haron, 2009) evaluated the overall pure technical and scale efficiencies for Malaysian commercial banks during the period 2000-2006. The results suggest that domestic banks were relatively more efficient than foreign banks. They suggested that the domestic banks' inefficiency were attributed to pure technical inefficiency rather than scale inefficiency. In contrast, foreign banks inefficiency was attributed to scale inefficiency rather than pure technical inefficiency.

(Khalid AlKhathlan and Syed Abdul Malik, 2010) analyzed the relative efficiency of Saudi Banks using annual data from 2003 through 2008 using DEA. The results show that, on a relative scale, Saudi banks were efficient in the management of their financial resources. In addition, the results would provide crucial information about the Saudi banks' financial conditions and management performance for the benefit of bank regulators, managers and bank stock investors. (Nigmonov, 2010) studied the banks' performance and efficiency in Uzbekistan for the period of 2004-2006. The basic two DEA models were applied to analyze the data under the assumption of constant and variable return to scale. The results have revealed that inefficiency occurs due to technical efficiency and overall banks average efficiency level decreased. (Sufian and Habibullah, 2010) analyzed the efficiency of the Thailand banking sector covering the duration 1999-2008 with the help of DEA approach. The results have shown that inefficiency was offset during formulation of technical efficiency with respect to pure technical efficiency in the banking sector. The efficiency level of banks in data envelopment analysis is measured using ratio of weighted sum of outputs to weighted sum of inputs. (Joseph Magnus Frimpong, 2010) examined the relative efficiency of the banks in Ghana during the year 2007 based on the dataset provided by Ghana Banking.

(Mehmet Hasan Eken and Suleyman Kale, 2011) studied the performance model for measuring the relative efficiency and potential improvement capabilities of bank branches by identifying their strengths and weaknesses and the production and profitability aspects of branches. Under both production and profitability approaches, efficiency characteristics of branches, which are grouped according to different sizes and regions, have similar tendencies. In both analyses, it is apparent that branch size and scale efficiency are related to each other. As branch size increases scale efficiency increases too and after the most productive scale size, however, as size increases efficiency decreases. Too small and too large branches need special attention. Putting production and profit efficiency scores on two scales reveals the performing characteristics of branches. Each region needs different handling. Branches with low production-low profit efficiency should be evolved towards high production-high profit efficiency region. (Tobias Olweny and Themba Mamba Shiphoh, 2011) studied to determine and evaluate the effects of bank-specific factors; Capital adequacy, Asset quality, liquidity, operational cost efficiency and income diversification on the profitability of commercial banks in Kenya. The second objective was to determine and evaluate the effects of market structure factors: foreign ownership and market concentration, on the profitability of commercial banks in Kenya. This study adopted an explanatory approach by using panel data research design to fulfill the above objectives. Annual financial statements of 38 Kenyan commercial banks from 2002 to 2008 were obtained from the CBK and Banking Survey.

(Mohammad Romel Bhuia, Azizul Baten, Anaton Abdulbasah Kamil and Nandini Deb, 2012) analyzed the relative efficiency of Bangladesh online banks during 2001 – 2007 by utilizing Data Envelopment Analysis. Based on the several online sampled banks, the findings reveal that the most efficient banks were AL-Arafah Islami Bank Limited, Shahajalal Islami Bank Limited, Eastern Bank Limited, and the less efficient banks over the study period were Janata Bank Limited, Uttara Bank Limited, United Commercial Bank Limited, Pubali Bank Limited, and AB Bank Limited. Among the three groups Group-1 (n=20), Group-2 (n=18), Group-3 (n=15) it was observed that the individual efficiency level of banks are increasing group by group. The efficiency level of Group-2 was slightly increased from the efficiency level of Group-1. The source of efficiency of the sampled

banks was found to be lower for technical efficiency and scale efficiency rather than pure technical efficiency. (Anastasios D. Varias and Stella Sofianopoulou, 2012) evaluated the efficiency of the biggest commercial banks that operated in Greece at the financial year 2009 by using DEA with multiple inputs and outputs. The innovation of the paper refers to the choice of data and the use of a combination of the intermediation approach. The results indicate several inefficiencies that may not have direct relation to the profitability of such institutions. But, these inefficiencies indicate the vulnerability of the Greek banking system and its potential to ask for help from the FSF (Financial Stability Fund).

(Aswini Kumar Mishra, Jigar, N., Gadhia, Bibhu Prasad Kar, Biswabas Patra and Shivi Anand, 2013) tested the soundness and the second is to measure the efficiency of 12 public and private sector banks based on market cap. As far as the first objective is concerned, CAMEL approach has been used over a period of twelve years (2000-2011), and it is established that private sector banks are at the top of the list, with their performances in terms of soundness being the best. Public sector banks like Union Bank and SBI have taken a backseat and display low economic soundness in comparison. On the other hand, the present study makes an attempt to measure the efficiency change of these selected banks operating in India during 2010-2012. By using frontier based non-parametric technique, Data Envelopment Analysis, provides significant insights on efficiency of different banks and places the private sector ones at an advantageous position and thereby hints out the possibility of further improvisation of most of the public sector banks. DEA results exhibit that among the public sector banks, the performance of Bank of India, Canara Bank and Punjab National Bank got dampened in the last two years under study where as among the private sector banks, except the case for Axis Bank which was not found to be satisfactory at all, the remaining private sector banks shows marked consistency at their efficiency level during the period under study. (Saâd Benbachir, Mohamed Abouch, Yassine El Haddad and Anas Benbachir, 2013) evaluated the relative efficiency for the bank branches of a Moroccan regional bank during the period 2007-2010 using DEA. As a result, they identified the inefficient bank branches with the help of identifying their strengths and weaknesses. (Karan S. Thagunna and Shashank Poudel, 2013) studied the relative efficiency and potential improvement capabilities of Nepali banks by scrutinizing intermediation aspects with the help of DEA. The outcome of this study reveals that efficiency level is relatively stable and has increased overall. Additionally, it also breaks down the overall efficiency of banks into technical and scale efficiency. Sangeetha R. and Jain Mathew, 2013) studied banking companies in the service sector exhibiting the problem of distinct results in terms of efficiency. To measure the stability, sustainability and profitability of the banking system, it is therefore crucial to scale the operations of banks performing in India. A well-organized banking system will provide an extensive way to higher economic growth in any country. Thus, evaluating the technical efficiency is important to depositors, owners, potential investors, managers and to policy makers. The present study investigates the technical efficiency of public sector banks in India by considering the study period between 2008-09 and 2010-11. For this purpose, the data envelopment analysis was used with two input variables and two output variables. The efficiency scores were calculated for a sample of twenty-six public sector banks operating in India. The result shows that Corporation Bank, State Bank of India and IDBI were consistently performed efficiently in all the years under study.

3.0 RESEARCH METHODOLOGY

3.1 DATA COLLECTION

For this study, the required data of the sixteen Private Banks have been taken from the respective official websites for the financial years 2007-2012.

3.2 SELECTION OF INPUTS AND OUTPUTS

Reviewing the literature on the application of data envelopment analysis (DEA), different studies have used different combination of inputs and outputs. In this study the researcher considered four input variables and three output variables in order to have an elaborate study. The variables under the study are listed below:

Input Variables	Output Variables
Operating Expenses	Net Interest Income

Deposits	Investments
Total Expenditure	Assets
Labor	

3.3 PEARSON CORRELATION BETWEEN VARIABLES

To start with the DEA approach, the correlation values will be evaluated and used to examine whether the association of the input and output variables obey the isotonic hypothesis. The table given below indicates that a significant positive association exists between the input and output variables, which specifically states that the isotonic hypothesis exists. It further conveys that the DEA can be used to know the efficiency of the banks.

	I1	I2	I3	I4	I5	I6	I7
I1	1						
I2	.973**	1					
I3	.982**	.975**	1				
I4	.942**	.956**	.930**	1			
I5	.862**	.887**	.890**	.872**	1		
I6	.819**	.864**	.855**	.853**	.982**	1	
I7	.851**	.887**	.879**	.868**	.994**	.993**	1

** . Correlation is significant at the 0.01 level (2-tailed).

3.3 CCR AND BCC MODEL

The original CCR model was pertinent only to that expertise which is categorized by constant returns to scale. The major advancement was extended by Charnes, and Cooper (BCC) model to facilitate expertise that reveals variable returns to scale. This study has used input-oriented DEA model, which emphasizes on the minimization of inputs and the maximization of outputs held at their current levels. Also the BCC model with variable return to scale is considered.

3.3.1 GENERAL FORM OF CCR MODEL:

The general form Output Maximization DEA [CCR] model can be represented in the form of Fractional Programming Model as follows: Here the general model is constructed to maximize the efficiency of the q^{th} output variable:

v_{jq} - j^{th} output value of the q^{th} DMU; y_{jq} - j^{th} output variable of the q^{th} DMU; u_{iq} - i^{th} input value of the q^{th} DMU

x_{iq} - i^{th} input variable of the q^{th} DMU; E_q - Efficiency of the q^{th} DMU

$$Max E_q = \frac{\sum_{j=1}^m v_{jq}y_{jq}}{\sum_{i=1}^s u_{iq}x_{iq}}, \text{ subject to } \frac{\sum_{j=1}^m v_{jq}y_{jq}}{\sum_{i=1}^s u_{iq}x_{iq}} \leq 1; q = 1, 2, \dots, n$$

$$v_{jq}, y_{jq}, u_{iq}, x_{iq} \geq 0 \text{ for all } i = 1, 2, \dots, s; j = 1, 2, \dots, m, q = 1, 2, \dots, n$$

Solving this fractional programming problem directly is so tedious; hence the fractional programming model is converted into regular linear programming model as described below:

$$Max E_q = \sum_{j=1}^m v_{jq}y_{jq}; \text{ subject to } \sum_{i=1}^s u_{iq}x_{iq} = 1; \sum_{j=1}^m v_{jq}y_{jq} - \sum_{i=1}^s u_{iq}x_{iq} \leq 0; q = 1, 2, \dots, n$$

$$v_{jq}, y_{jq}, u_{iq}, x_{iq} \geq 0 \text{ for all } i = 1, 2, \dots, s; j = 1, 2, \dots, m, q = 1, 2, \dots, n$$

The general form of input minimization DEA [CCR] linear programming model can be represented as follows:

$$\text{Min } E_q = \sum_{i=1}^s u_{iq} x_{iq}; \text{ subject to } \sum_{j=1}^m v_{jq} y_{jq} = 1; \sum_{j=1}^m v_{jq} y_{jq} - \sum_{i=1}^s u_{iq} x_{iq} \leq 0; q = 1, 2, \dots, n$$

$$v_{jq}, y_{jq}, u_{iq}, x_{iq} \geq 0 \text{ for all } i = 1, 2, \dots, s; j = 1, 2, \dots, m, q = 1, 2, \dots, n$$

3.3.2 GENERAL FORM OF BCC MODEL:

The DEA envelopment program for considering variables return to scale is as follows:

$$\text{Min } \theta_m \text{ Subject to } Y\lambda \geq Y_m; X\lambda \leq \theta X_m; \sum_{n=1}^N \lambda_n = 1; \lambda \geq 0; \theta_m \text{ free variable}$$

4.0 EMPIRICAL RESULTS

4.1 INPUT ORIENTED TECHNICAL EFFICIENCY (CONSTANT RETURN TO SCALE)

The table-1 communicates that the DEA efficiency score based input oriented technical efficiency [Constant return to scale] under the CCR Model. The Analysis report strongly communicates that twelve banks are relatively efficient based on the input oriented technical efficiency [CRS] for the year 2007 – 2012. It is observed that there is a varying trend in their mean of technical efficiency of commercial banks of India from 2007 to 2012, the scores lies in the interval [0.8474, 1]. The Analysis report reveals that among the sixteen private banks considered for the study only the City Union Bank is highly consistent with the efficiency score of 1. Through the period the mean efficiency of all the banks put together is less than one.

4.2 INPUT-ORIENTED PURE TECHNICAL EFFICIENCY (VARIABLE RETURN TO SCALE)

The table-2 refers that the DEA efficiency score based input oriented technical efficiency [Variable Return to Scale] under the BCC Model. In BCC Model there is an increase in number of banks which shows the consistency in their performance. It is observed that there is a varying trend in their mean of technical efficiency of commercial banks of India from 2007 to 2012, the scores lies in the interval [0.8998, 1]. Also it reveals that among the sixteen private banks considered for the study out of which five banks are highly consistent with the efficiency score of 1.

5. SUMMARY AND CONCLUDING REMARKS

This research analysis is based on the application of Data Envelopment Analysis to compute the relative efficiency of sixteen private banks of India. The outcome of this research study reveals certain constructive managerial insights into evaluation and advancing of banking operations. The estimated result analysis shows that only one bank only the City Union Bank is relatively efficient with maximum efficiency score 1 throughout the study period. The remaining banks are not. The remaining fifteen banks should take necessary measure in order to successfully endorse their resource utilization efficiency by improved efficient handling of all the input and output variables.

Table – 1

Name of the Bank	2007-2008	2009-2010	2010-2011	2011-2012	2012-2013	Mean efficiency [Input]
Axis Bank	1	1	0.975	1	1	0.995
City Union bank	1	1	1	1	1	1

Development Credit Bank	1	1	0.673	1	1	0.9346
Dhanalakshmi Bank	1	1	0.577	0.969	0.933	0.8958
Federal Bank	0.938	0.975	0.820	0.973	1	0.9412
HDFC Bank	1	1	0.677	1	0.978	0.931
ICIC Bank	1	1	1	0.955	1	0.991
IndusInd Bank	1	1	.778	1	0.987	0.953
Ing Vysya Bank	1	1	0.538	0.973	1	0.9022
Jammu & Kashmir Bank	1	1	0.845	0.743	1	0.9176
Karnataka Bank	0.996	1	0.927	0.778	1	0.9402
Karur Vysya Bank	1	1	0.939	0.854	0.991	0.9568
Kotak Mahindra Bank	1	1	0.467	0.883	0.887	0.8474
Lakshmi Vilas Bank	1	1	0.837	0.943	1	0.956
South Indian Bank	1	1	0.842	0.810	1	0.9304
Yes Bank	0.948	0.896	0.853	1	1	0.9394
Mean Efficiency	0.993	0.992	0.797	0.930	0.986	

Table-2

Name of the Bank	2007-2008	2009-2010	2010-2011	2011-2012	2012-2013	Mean efficiency [Input - VRS]	Mean of mean efficiency of input CRS	Mean of mean efficiency of input VRS	Mean	Rank based on mean of mean efficiency
Axis Bank	1	1	1	1	1	1	0.995	1	0.9975	2
City Union bank	1	1	1	1	1	1	1	1	1	1
Development Credit Bank	1	1	1	1	1	1	0.9346	1	0.9673	5
Dhanalakshmi Bank	1	1	1	0.971	1	0.9942	0.8958	0.9942	0.945	11
Federal Bank	0.965	0.998	0.864	0.974	0.996	0.9594	0.9412	0.9594	0.9503	8

HDFC Bank	1	1	0.682	1	1	0.9364	0.931	0.9364	0.9337	13
ICIC Bank	1	1	1	1	1	1	0.991	1	0.9955	3
IndusInd Bank	1	1	0.802	1	1	0.9604	0.953	0.9604	0.9567	6
Ing Vysya Bank	1	1	0.539	1	1	0.9078	0.9022	0.9078	0.905	15
Jammu & Kashmir Bank	1	1	0.892	0.744	1	0.9272	0.9176	0.9272	0.9224	14
Karnataka Bank	1	1	0.978	0.779	1	0.9514	0.9402	0.9514	0.9458	10
Karur Vysya Bank	1	1	0.989	0.855	1	0.9688	0.9568	0.9688	0.9628	6
Kotak Mahindra Bank	1	1	0.511	1	0.988	0.8998	0.8474	0.8998	0.8736	16
Lakshmi Vilas Bank	1	1	1	1	1	1	0.956	1	0.978	4
South Indian Bank	1	1	0.875	0.811	1	0.9372	0.9304	0.9372	0.9338	12
Yes Bank	0.973	0.916	0.895	1	1	0.9568	0.9394	0.9568	0.9481	9
Mean efficiency	0.996	0.995	0.877	0.946	0.999					

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A LOOK AT CONSUMER PERCEPTIONS ABOUT BUSINESS ETHICS

Sally Sledge, Norfolk State University, U.S., sasledge@nsu.edu
Pam Pringle, Christopher Newport University, U.S., ppringle@cnu.edu

ABSTRACT

The topic of business ethics makes the news almost on a daily basis. Too many ethics scandals are taking place in corporate America as well as in other organizations. While the media attention helps to shed light on this subject, it does not do much to remedy the problem. In this paper, we provide results from our survey which focused on consumer perceptions of business ethics. Our findings will assist organizations and educational institutions in providing needed ethics training and development. Strategies will be given that could enable businesses to manage their corporate reputation and consumer base in the marketplace.

INTRODUCTION

Corporate ethical scandals are in the news regularly. The media rarely overlooks an opportunity to expose a bad decision or poor choice made by a business executive or leader. This trend is not new. Ethical dilemmas have been making the news since the beginning of time. Notable cases in recent history include the Ford Pinto car case of the 1970s, and more recently, the Enron and Arthur Anderson document cover-up cases of the 2000s (www.cnn.com). There are numerous reasons for these incidents, including the 24/7 environment in which most businesses must operate, tough global competition, shortened product life cycles, multiple forms of technology that can record the individuals involved in the events, and the fact that scandals sell newspapers and television programming time. This phenomenon has been going on for many decades, and there is no end in sight.

Yet this is a complex topic. Education about ethics and integrity needs to be a focus in high schools and continue at the undergraduate and graduate levels of colleges and universities, and the business community needs to provide more training and development for its employees. As technology capabilities grow, and global business involves more parties, the opportunities for misconduct grow. Also, disparate ethical norms around the globe present challenges in the international business environment. Levels of corruptions vary widely from country to country as shown in the Corruption Perceptions Index (CPI) 2004, by Transparency International (Crittenden, Hanna and Peterson, 2009). Anand, Ashford, and Joshi, (2004) have suggested that corrupt actions tend to encourage corrupt actions. It is impossible to prevent all unethical behaviors in the workplace but companies need to take a more proactive approach. Beets (2005) and Everett, Neu, and Rahaman (2006), suggest that education and training in business ethics is critical to stem the breeding of unethical practices within organizations.

Due to the continuing number of scandals that have generated an inadequate response from management, such as the British Petroleum oil spill of 2010 and the Facebook information leak of 2012 (www.cnn.com), it is obvious that businesses need guidance in educating and training their employees to prevent unethical incidences, as well as establishing policies and procedures to handle such incidents when they occur. Currently, many managers and employees are not exposed to the types of ethics training which can facilitate good ethical decision making. Unfortunately, exposure to the topic of ethics and discussions on how to deal with ethical situations often comes after a scandal has made headline news. This usually is too little too late to have a meaningful impact in the affected workplace or its consumer's perceptions. The findings in this paper will provide evidence from consumers about how they believe these businesses can regain their position in the marketplace after ethical breaches. Our results shed light on what customers want from their providers in terms of ethical behavior. This information can be used to guide these types of training programs and classes both in business organizations and in colleges and universities.

LITERATURE REVIEW

Many business researchers have studied the topic of business ethics and consumer behavior. DePelsmacker, Driesen, and Rayp (2005) stated that customers often display an “attitude-behavior gap” between making purchase decisions and their perceptions about ethical products. Conversely, these scholars also noted the growing trend of ethical consumption, whereby more companies and customers buy and sell products that have an ethical component or promote corporate social responsibility. In one study, Hines and Ames (2000) reported that the majority of U.S. consumers had purchased products because of a company’s positive social reputation. Ghillyer (2012) reminds us of the debate as to whether business ethics are utilitarian, offering the most good for the largest number of people, or universal, where companies act based on moral duty and obligation to do the right thing. These varying perspectives lead to different choices on the part of organizational decision makers. According to Fullerton, Kerch and Dodge (1996) “ethical behavior on the part of both buyers and sellers is tantamount to effectiveness of the market place”. Unethical behavior damages this relationship leading to ineffective exchanges (Morgan and Hunt 1994).

Other studies have included more specific business ethics topics. Berthon, Pitt, Plangger and Shapiro (2012) point out the importance of the internet, social media and shifts in technology culture in marketing, which includes the marketing of ethics. Furrer (2011) found that in countries like the United States with small power distance between individuals, more stringent corporate governance regulations, and efficient business education systems, respondents believed that corporate social responsibility and economic responsibility were compatible goals for businesses. For many business owners who believe this, ethics becomes a central component of running a successful business (Cragg, 1997). Hence there are many facets to business ethics which must be appropriately coordinated by companies.

Within the field of ethics, research shows that consumer perceptions do impact consumer behavior. Singh, Iglesias and Batista-Foguet (2012) note that consumers exhibited a positive relationship between perceptions of brand ethicality and brand trust and brand affect (the brand image). Brand trust and brand affect (image) were positively related to brand loyalty, which directly impacts consumer purchasing decisions. So it makes sense for businesses to manage their brand image and their corporate reputations among consumers. Tsalikis and Seaton (2006) developed the Business Ethics Index to measure consumers’ perceptions on the ethical behavior of businesses. They have taken these measurements each year since and Tsalikis (2011) reported that the 2009 BEI showed perceptions have been declining criticism of management conduct and that remuneration has increased. Singhapakdi, Rawwas, Marta, and Ahmed (1999) pointed out the importance of culturally-based ethical values among consumers, and how they incorporate those sentiments into their purchasing decisions. Creyer (1997) found direct evidence that consumers who indicate that they do care about a firm’s ethical behavior will make buying decisions based on that information. Trudel and Cotte (2008) found that patrons were willing to pay a premium for goods that were produced ethically. Additionally, they found that those customers who cared the most about corporate social responsibility were willing to pay the largest premiums for the ethical goods. Yet Maignan (2001) revealed that U. S. consumers expressed more interest in corporations’ economic bottom line than in their ethical standards and legal behavior. Thus there are varying results in this area of ethics research. This study will add to the literature by identifying consumer preferences for ethical actions on the part of companies and also consumer preferences for corporate actions after ethical misconduct has occurred.

SURVEY AND SAMPLE

The survey was designed to assess consumer perceptions about business ethics as well as consumer intentions to purchase based on business’ ethical behavior. Questions consisted of those framed after several national and international ethics surveys, including those from the International Center for Academic Integrity (www.academicintegrity.org), and the Ethics Resource Center (www.ethics.org). Additionally, the authors created questions of their own to address specific research agenda items. Using questions modeled after these pre-tested surveys addressed the concerns of reliability and validity for this project. The final survey consisted of a one page multiple choice instrument, with a few open-ended questions to allow for participants’ comments.

173 college students were surveyed from 2 colleges in the Southeastern United States. All respondents participated voluntarily and anonymously. They were free to ask questions of the authors before, after and during the administration of the survey. The total survey response rate was 90%.

RESULTS

The survey questions were analyzed using quantitative and qualitative techniques. The major results from the survey follow, with a percent response rate for key questions, followed by participant comments that support the findings.

PERCEPTIONS OF BUSINESS ETHICS SURVEY RESULTS

N = 173

CORPORATE ETHICS RESULTS	COMMENT
3% were never interested in corporate business ethics.	"Not applicable."
66% said that one person or even a small group of unethical people in a company constitute unethical behavior on the company's part.	"Make sure whoever created the scandal is no longer part of the company... make proper precautions so nothing bad happens for a long time."
68% said it would take a year or years to gain back a good reputation after corporate ethical scandals.	"Plenty of time with no problems."
41% said the environmental concerns were equal to profit concerns that result from corporate scandals, while 42% said environmental concerns were greater.	"I know people think money matters more but that is wrong."
21% said environmental scandals were the worst type while 25% said that misleading consumers was the worst type of scandal.	"To fully regain trust of its consumers a company simply must fully disclose all information regarding it along with correcting the mistakes it made."
31% said it was okay for companies to display different sets of ethics in different parts of the world	"Obey the laws and work within them."
CONSUMER BEHAVIOR RESULTS	COMMENTS
2% said an unethical action would not affect their decision to do business with the company.	"Have an ongoing monster sale."
5% would not be willing to do business with a company involved in an ethical scandal, regardless of the actions it took after the fact	"I really don't think they can recover." "Discontinue its operation."
45% said companies should release all details after a scandal to the public	"Be open about what they are doing and changing; provide consumers with more information than they have to."
Only 3% said that a company should avoid telling U.S. consumers about a scandal in Europe and vice versa	"The company can address the issues and give the customers an incentive to come back."
61% said always tell the truth is the best business motto	"Be honest about the details of the scandal, apologize to all parties involved, do your best."
Only 13% indicated that they minded paying more for products from ethical companies.	"Show integrity and convey it to customers." "Do customer empowerment on things."

TAKEAWAYS

College educators as well as corporate executives can use these findings to better educate their students and employees about business ethics that incorporate the consumer viewpoint. In this study, business student consumers shared their opinions about how businesses should act ethically as well as their thoughts about how businesses should respond after an ethical scandal. Below are some key points from the research.

1. Our survey shows that adults are interested in business ethics. Only 3% were not interested in knowing about business ethics. Thus, businesses should make their ethical practices known to potential customers.
2. One person acting unethically impacts consumer sentiments about a company's reputation. Therefore, all employees need ethics training and development regularly.
3. Companies can expect to take at least 1 year to repair their reputation in consumers' eyes after ethical scandals. Executives and managers should plan on a long-term marketing campaign to address the behavior.
4. Consumers are split on the profit and environmental impact of corporate scandals. Therefore, both mandates need to be considered in the recovery from such an incident.
5. Consumers dislike environmental scandals almost as much as those that mislead consumers. Proactive organizational strategies need to be in place to avoid both types of events.
6. Some consumers believe it is okay to have different ethics in different countries, as long as they abide by the law. Since other consumers do not approve of this, it is important for executives to emphasize that they are in compliance with the law, and in fact go beyond that.
7. Business reputation impacts consumer decisions to purchase. Only 2% said that unethical behavior would not impact their purchasing decisions. Managers need to feature corporate social responsibility efforts in their marketing campaigns.
8. Very few consumers, only 5%, were unwilling to purchase from a company after a scandal, even if the company takes proactive steps to change its behavior. This indicates that companies can win back most consumers after changing policies, making things right, and being open with the public but it will take time and transparency.
9. Almost half of consumers (45%) want to know all details of corporate scandals, so companies should be forthright about providing this information. Using websites, social media, and other outlets will reach different populations.
10. Consumers want to know about scandals around the world, not just in their backyards. Companies cannot afford to have someone else share their news. A proactive plan needs to be in place to alert consumers everywhere about ethical incidents.
11. Consumers want the truth from their providers of goods and services. Companies should have a crisis management plan in place if a scandal breaks. Details need to be shared with the public to maintain a good corporate reputation.
12. Not all consumers are willing to pay more for products from ethical companies. However, 87% would be willing to pay more, (23% all the time, 27% on certain products and 37% when their budget allows). Unethical practices will reduce a company's customer base over time.

A policy or code of conduct/ethics code on its own will do little to change the culture within the organization. Using that code or policy as a basis for discussion with employees in small training groups will encourage sharing of views among the diverse employee base. Use of real world example and videos can also generate discussion. It is in this type of discussion environment that perceptions and therefore future actions can be enhanced. If a company has a newsletter, establishing a regular ethics column inviting employee input can be very effective. The same idea can be used on an internal company website. The key is to provide this type of training on an ongoing basis. As new employees are hired they should be engaging in small discussion groups with current employees. This also provides continuing training on a rotational basis for current employees. Encourage employees to discuss situations that arise with each other. Better decisions are made when all the key facts are known. Collaboration and discussion will increase the likelihood of solid ethical decisions being made. Transparency is

key. Consumers expect it and today shareholders are demanding it. Employees will make better decisions if they have access to the necessary information. Researchers suggest that unethical acts or questionable practices carried out by employees are, in the majority of cases, done in efforts to reach perceived organizational performance goals and not for personal gain (Brewer, Chandler and Ferrell 2006, and Kelly 2005).

It is vital that university students engage in discussions on their views of business ethics and are exposed to real world examples. Administering a survey such as described in this paper, sharing the results and engaging the students in a discussion can allow them to hear other points of view and share their own in a non-threatening environment. Ethics should be a subject of discussion in every course a student takes – part of the fabric of everything they do. Extensive research by McCabe, Trevino and Butterfield (2002) has shown that when a culture of integrity is created through the use of an honor code and supporting programs such as speakers, special activities, training and development sessions and consistent application of the code, the incidence of ethical violations both academic and otherwise can be dramatically reduced on college campuses.

LIMITATIONS AND FUTURE RESEARCH

This study was limited by a small sample size. We intend to replicate this study using Canadian, European and US data and prepare a multinational comparative analysis. Another limitation was the fact that we could not delve deeper into the questions due to the anonymous format of the survey. Another planned methodology in the future will be to add focus group research to allow for more in-depth discussion with consumers about their sentiments regarding business ethics and ethical scandals. Another possibility for future research will be to perform a longitudinal analysis to determine if these perceptions change over time.

CONCLUSION

The findings here provide data that managers can use to educate employees about consumer perceptions regarding business ethics. The results can also be used by college faculty to inform their students about business ethics. There is evidence that such exposure does make the recipients more comfortable with business ethics. For example, one study showed that upper college level classes exhibit more ethical behavior than lower college level classes (Smyth, Davis, and Kroncke, 2009). McCabe et al. (2002) of the International Center for Academic Integrity showed that students from schools with Honor Codes were less likely to cheat on exams and assignments than students from non-Honor Code schools. Additionally, LRN Research, Incorporated (2006) found that 73% of employees with a code of conduct at work said it made the company a better place to work, while 82% reported applying the code of conduct often on the job. These findings show direct links between ethics education and policies, and applied ethical knowledge. In addition, the respondents here were very eager to participate in the study and over 95% gave feedback to the open-ended questions, in some cases going over the given space allotted to express their opinions. This strong response on the part of the participants shows that they had definite ideas about business ethics and were willing to share them. We believe executives would be wise to take full advantage of these results to improve the ethical climate for their managers, employees and customers, and thus creating organizations that are transparent, accountable, socially responsible and as a result, highly profitable in the long term.

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Applying Electronic Medical Records (EMR) to Reduce Health Disparities

Rajni Goel and Loren Nunley
School of Business, Howard University

ABSTRACT

Over the past four decades, the notion of inequities in healthcare has slowly surfaced. The term Health Disparity has become in vogue bringing to the fore the immensely serious challenges the healthcare system faces today. Some research has helped us to better understand the various causes of health disparities. Far less research has explained appropriate ways to reduce health disparities. We consider how technology can be molded to fit the current medical model. We evaluate best practices for the utilization of Electronic medical records (EMR) by posing the question: "Are there elements of the Information Systems sector that could aid in these efforts to eliminate health disparities?" This paper will outline a new way to utilize EMR to aid in the elimination of health disparities.

INTRODUCTION

Inequities in this society have long existed sparing no industry. Over the past four decades, the notion of inequities in healthcare has slowly surfaced onto the radar of the American psyche. The term *Health Disparity* has become in vogue bringing to the fore the immensely serious challenges the healthcare system faces today. Past research has helped us to better understand the various causes of health disparities, but, little research has delved into appropriate ways to reduce or ideally eliminate health disparities.

With the rapid development of technology throughout the landscape of society, we consider how technology can be molded to fit the current medical model. The advent of the electronic medical record (EMR) is, perhaps, the first attempt at that endeavor. As EMR continue to become more widely adopted, we propose evaluating best practices for the utilization of EMR. In an effort to 'think outside the box' for new solutions, we pose the question: "Are there elements of the Information Systems sector that could aid in these efforts to eliminate health disparities?" This paper will attempt to answer this question by outlining a new way to utilize EMR to aid in the elimination of health disparities.

BACKGROUND: HEALTH DISPARITIES

In an effort to, first, analyze the challenge before recommending a solution, the term *Health Disparity* should be simplified into two parts, *Health* and *Disparity*. According to the World Health Organization (WHO), "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."¹ The modern definition of disparity describes "a state in which there is no equality and similarity, especially in a way that is not fair. [2]" Though seemingly clear, combining these two definitions has proven to be a difficult task over the past four decades with many different public health organizations creating its own unique definition. In the interest of brevity, this paper is guided by the following interpretation: Healthy People 2020 defines a *health disparity* as "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion.[3]"

Though the definition of health disparities evolves, it exists and continues to have an indelible impact on society. Its footprint can be found on everything from the cost burden of healthcare in America to the higher death rates in minority communities from diabetes, cancer and heart disease. Its impact cannot be understated when describing the health of the nation. As these ostensible health disparities persist, the amount of deaths due to poverty, obesity, violence and preventable disease mount. The causes of health disparities have been debated for years [4]; an extensive review of the literature illustrates three common causes:

1. Quality of Care: It has been documented that, amongst various racial and ethnic minority populations, (e.g. African American, Latino, and Native American) there is an apparent disparity in the quality of

healthcare each population receives as compared to that of the majority population [5]. Disparities in quality of care typically are attributed to three main reasons:

1. *Deficient Preventative Care*: Minority populations have a higher percentage of uninsured people. Financial constraints often prevent uninsured patients from seeking recommended screenings (e.g. mammograms, prostate and colon cancer) [6]
 2. *Health Literacy*: Adequate healthcare is contingent upon the patient's understanding of the information communicated to them by the provider. Often, due to language barriers or miscommunication, medication is taken improperly or therapy is administered incorrectly [7].
 3. *Bias*: Both conscious and unconscious bias by either the provider and/or the patient can lead to disparities in quality of care. Poor treatment or lack of treatment often occurs due to perceived negative stereotypes attached to patient populations by providers. Lack of trust by the patient based on perceived stereotypes of the provider may also play a significant role in how care is administered and subsequently received. [8]
2. *Access to Care*: The bulk of the existing literature has historically described access to care as the major cause of health disparities. Various barriers exist in certain communities that bar patients from accessing quality healthcare. It is well documented that geographic areas of lower socioeconomic status have less healthcare providers in the immediate area than do geographic areas of higher socioeconomic status. Less healthcare providers within proximity of one's home leads to less well-care visits for both children and adults. Less well-care visits lead to the development of chronic conditions. These unchecked chronic conditions lead to higher rates of mortality. Higher rates of mortality lead to further distrust of the healthcare system by the affected communities. Further distrust leads to increasing health disparities. This illustrates the vicious cycle that health disparities perpetuate [9].
- Examples of reasons for access are abundant, but a few are relevant to illustrate here. *Age* can play a significant role as elderly patients may have increasing difficulty traveling to and from a provider [10]. *Lack of a Primary Care Provider* can negatively impact a family as the family becomes increasingly reliant on Emergency Department visits, which become incredibly costly to the patient and ultimately, the society if the patient cannot afford to pay [11]. *Lack of Diversity in Healthcare* has proven to be another hurdle to access care as patients innately are more comfortable visiting a provider that resembles them [5].
3. *Social Determinants of Health*: Finally, social determinants of health represent the newest theories purported to cause health disparities; our work is provides a framework to reduce disparities by using technologies as EMRs to gain timely and accurate intelligence regarding the patient.

EMRs AND SOCIAL DETERMINANTS OF HEALTH

According to WHO, "the social determinants of health are the conditions in which people are born, grow, live, work and play, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices. The social determinants of health are mostly responsible for health inequities - the unfair and avoidable differences in health status seen within and between countries."¹² Most experts now agree that social determinants of health are the main culprit in causing health disparities and multiple factors contribute to racial and ethnic health disparities. *Residential segregation*: We are seeing now that the k-12 public school systems are resegregating to levels approaching and in some cases exceeding levels found prior to the historic 1954 Brown v. The Board of Education Supreme Court Decision. This has grave implications for health in understanding the role of segregation and its relationship to health disparities. We know that there is considerable variation in the distribution of health risk and health enhancing resources across communities. Put simply, one's zip code is more important than one's genetic code.

Occupational risks and exposures: People of color disproportionately work in high-risk jobs exposed to a variety of hazardous chemicals and other kinds of factors that may increase the risk of illness, accidental injury or death. Low-income communities and communities of color are more likely to be exposed to environmental hazards, as well. For example, 56% of residents in neighborhoods with commercial hazardous waste facilities are people of color even though they comprise less than 30% of the U.S. population [13].

Health risk and health-seeking behaviors: This encompasses differences in diet and active lifestyle. This context is essential to understanding health behavior. The city of Detroit as recent as five years ago did not have a single major grocery store or supermarket within its city limits. Consequently, it does little good in Detroit to preach to

people about eating fresh fruits and vegetables if they do not have geographic access to those foods. The problem is compounded in Detroit because if one does not have reliable, personal transportation s/he has no way to travel to the suburbs to purchase fresh fruits and vegetables because there is no reliable public transportation infrastructure. African Americans are five times less likely than whites to live in census tracts with supermarkets, and are more likely to live in communities with a high percentage of fast-food outlets, liquor stores and convenience stores. Black and Latino neighborhoods also have fewer parks and green spaces than white neighborhoods, and fewer safe places to walk, jog, bike or play [14].

The “poverty tax”: Residents of poor communities pay more for the same consumer products than those in higher income neighborhoods – more for auto loans, furniture, appliances and bank fees [14].

Clearly, the factors described above have implications for health, hence the term, social determinants of health. With a better understanding of the notion of social determinants of health, several questions can be postulated. First, “Do we care?” Perhaps, this is a personal question, but a vital one, nonetheless. Second, “Why do these challenges exist?” Third, “What can/will we do to positively affect these challenges?”

ELECTRONIC MEDICAL RECORD

Providers must keep up with advances in not only medicine itself, but also the way providers practice medicine. In theory, just about every task performed by a provider on a typical day has been enhanced by recent technology [15]. Let’s explore a typical day in the office and how technology has theoretically impacted healthcare.

Patients now have electronic charts online. Through this service, patients can find their providers office, see available appointment times and book a slot without ever picking up the telephone. The patient, then, receives an automated confirmation call from the provider’s computer system. The provider is instantly aware of the modification in his/her schedule. When the patient arrives at the provider’s office, the medical assistant can let the provider know that the patient has arrived via a remote web camera feature. Meanwhile, the patient begins to upload his/her patient history using the kiosk in the waiting area. This allows the medical assistant the freedom to attend to other tasks. When the patient is finished uploading his/her history, s/he can then sign off on insurance and the necessary HIPPA forms, all of which is stored digitally. A scanner records the patient’s insurance card and the credit card reader takes the copay. Both are integrated into the provider’s computer system. Everything done on this visit will be recorded in the office’s computer system. Billing is integrated so only the correct codes will be sent to the biller based on the completion of the visit. Thus, the provider does not have to worry about under or over coding [16].

When the provider is ready, s/he can view the patient’s history electronically from all of his/her previous providers. Meanwhile, the nurse takes the patient’s vitals and records it on a tablet. Now, the provider can quickly review the patient’s history including the vitals that were just taken [17]. An important distinction to understand is that the software does not tell the provider how to treat his/her patient; it simply reminds the provider of what has already been done. After the visit, patient instructions regarding treatment can be printed immediately for the patient to take home and the patient’s prescription can be sent electronically to the pharmacy. Upon arrival to the pharmacy, the patient’s prescription is ready for pickup. Later in the day, the patient can access the ‘patient online portal’ to see the results from any lab tests conducted [18].

Billing used to be a pain, but no longer. The fully integrated system sends all the data from the appointment to the provider’s biller who then passes it on to the appropriate insurance company. Again, everything is on the computer. Consequently, there are no overages on the biller’s end and nothing missed on the provider’s end. Most importantly, the information can be stored forever in case of an audit. Additionally, digitized records allow for easy backup. Records can be automatically backed-up at any facility/facilities across the nation, or it can be backed up on a hard disk to be brought home by the provider. Thus, if anything were to happen to the provider’s office, the provider could set up shop virtually anywhere with no information loss. EMR allows quite the peace of mind for the provider[18].

The social history in its most rudimentary form is an age appropriate review of past and current activities. These activities may include occupation, substance abuse, recreation, sexual history and travel history. Experts say “along with the chance to connect with the patient as a person, the social history can provide vital early clues to the presence of disease, guide physical exam and test-ordering strategies, and facilitate the provision of cost- effective, evidence-based care. By knowing patients better and taking better social histories, better care will be provided, and physicians will be more fulfilled and energized [19].

All of this may be true IF the social history is taken properly and all too frequently, if it is even taken at all. Because of its perceived lack of immediate returns in terms of diagnosis, the social history has fallen down the proverbial totem pole of priorities in the eyes of many providers. With limited time and increasing patient volume, providers commonly tout lack of time as the reason for skimming the surface or omitting the social history all together.

If time is the greatest challenge, why not utilize the waiting room kiosk outlined above to allow patients the time to upload their full social history? If there is more time to complete the history, then patients can be more detailed and provide more accurate information. In fact, the social history of EMR can even be expanded to encompass all of the social determinants of health. Now that we have all of this detailed information about the patient, the question still remains, "What do we do with this information?" If the providers currently do not have time to ask the questions, then they certainly do not have time to synthesize and analyze this information.

PROPOSED FRAMEWORK

We must develop customized data mining software to synthesize the data provided in the social history. Data mining is the process of discovering new patterns from large data sets. The overall goal of the data mining process is to extract knowledge from a data set in a human-understandable structure.²⁰ This software will provide physicians with a unique report for each patient based on their social history describing what social determinants are negatively affecting their health. Armed with this information, providers can then help patients better understand their barriers to healthy outcomes and what adjustments can be made to improve their health.

Recently, similar methodology has been developed to mine large collections of EMR for temporal patterns associating drug prescriptions to medical diagnoses [21]. Other examples of applying data mining method applications are biomedical data facilitated by domain ontologies in genetic testing and mining clinical trial data [22]. In adverse drug reaction surveillance, data mining methods have been used to screen for reporting patterns [23].

Currently, IBM's SPSS Modeler and StatSoft's STATISTICA have received the highest satisfaction ratings in data-mining software. Microsoft and Oracle also hold a large part of the respective market share in data mining software. However, the most commonly used data-mining tool is open source software, R, a programming language that facilitates customized data mining. R is part of the growing open source network, the GNU Project [24]. Further market research as to the utility of data-mining software and synergy potential with EMR is necessary. This paper should serve as the initiation of such critical research into the strengths and weaknesses of implementing such technology.

CONCLUSION

We need a more comprehensive and holistic models of understanding the lived experience of race. When it comes to one's health, it is not just the fact that many young people of color grow up in high poverty neighborhoods, facing a number of direct and indirect assaults on health; it is the fact that these implications play out in health in many, often invisible, ways. Race structures life experiences in ways that shape health and encourage us to think holistically about how we can consider the many cumulative affects of the lived experience of race. In the socioeconomic health gradient, with each step up the socioeconomic ladder, one's health tends to improve and with each descending step, one's health tends to get worse because people of color are disproportionately in lower socioeconomic tiers. This is a key driver of the racial and ethnic health disparities that we see today.

We now recognize the significant role social determinants of health play in the existence of health disparities. Using technology, specifically EMR, as a tool, we can combat this deadly burden on society. Resistance to change is ever present, but there are more examples than ever of technological advances forcing behavioral change. Data mining remains a relatively new frontier in the field of medicine. Our initial framework provides the medical field with a new strategy to combat health disparities. With the healthcare cost burden reaching new heights, obesity rates exploding and mortality rates increasing, new solutions must be found. Analyzing the understated social history of EMR may very well be an indispensable piece to this deadly puzzle.

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EVALUATION OF TWO E-DISCOVERY SOFTWARE SYSTEMS

Azene Zenebe, Department of Management Information Systems, Bowie State University, USA,
azenebe@bowiestate.edu

Hanlynn Maung, Department of Management Information Systems, Bowie State University, USA,
benjamin.maung@gmail.com

ABSTRACT

Due to the escalating volume of digital data in today's legal cases, litigators are seeking ways to better manage time, cost and risk while dealing with either civil or criminal litigation cases. The electronic batch processing and loading data into case databases are the most time consuming and costly part of this process and many organizations in the industry uses the standalone LAW PreDiscovery software. Often, archives or embedded mail stores such as .pst, .ost files were received to process and 10GB of data took approximately 1 to 2 days if nothing went wrong during the process. Among many other options that are available on today's litigation E-Discovery software market, the new integrated early data assessment with LAW PreDiscovery software may make possible to set the stage for success. In order to evaluate the performance of the new integrated e-Discover software, an experimental research was performed using 25 test runs of random data files from the real world cases. The results from the experimental study confirmed that the use of the new integrated e-discovery tool outperformed the standalone LAW PreDiscover. On average, the amount of time saved is 1 minute and 26 seconds for average data size of 112.10MB. Furthermore, a strong positive correlation ($r=0.83$) between time saving and data size indicates that the amount time saving significantly increases as the size of data increases.

1. INTRODUCTION

The electronic batch processing and loading data into case databases are the most time consuming and costly part of the e-discovery process. Currently, many organizations in the industry uses LAW PreDiscovery program to process data that was collected. Often, archives or embedded mail stores such as (.pst, .ost) files were received to process and 10GB of data took approximately 1 to 2 days if nothing went wrong during the process to get Tiff images, extracted fulltext files, metadata and native files exported in the desired format for loading into either Summation, Concordance or Relativity databases. Also, the compounded or archived files can come with emails, attachments and other unrelated files that are not well robust for research and review by legal staff and it is difficult and labor intensive to manually pick and choose which ones to process out of thousands of various file types(Arent and Brownstone, 2003).

This paper attempts to search and explore opportunities that would improve the current e-Discovery process by saving cost and seeking ways to manage time while keeping data integrity and minimize risk. Experimental evaluation of such key applications that is currently in use and compare with future or recently updated tools that would increase productivity and efficiency of the e-Discovery practices is conducted.

This paper has five sections. Section 1 presents introduction followed by literature review in Section 2. Section 3 presents the research design followed by the results and discussion in Section 4. Section 5 presents the conclusion and future research.

2. LITERATURE REVIEW

According to Ginseng-Prophal (2011) "the amount of digital data created in a year will be 35 zettabytes (ZB) by the year 2020-that represents a stack of CDs that would reach halfway to Mars". Realizing that there were be so much data that will be produced and collected in the future, it is essential that the data processing applications should become more powerful to process such huge amount of data in the future. The situation with choosing right tools for e-Discovery will become a challenge as the variety can be overwhelming (Ginseng-Prophal, 2011).

E-discover software developers created applications to be available as either standalone product or integrated software. These applications select the source data that needs to be analyzed, perform inventory analysis of data set, identify true file types and eliminate invalid file extensions by looking at file headers, index email and attachments, detect and index archive items (.zip, .rar). The process contains DeNisting the data and filtering them by their hash values to remove system files, program files, executable files, and other unusable data files and look for duplicated files.

LAW PreDiscovery is one of the most widely used e-Discovery software. It has the following features (LexisNexis, 2012): Import only relevant data based on content, date range, duplicates, de-nist, file type & email domain filters; extract digital text and metadata; process thousands of different file types simultaneously; De-Nisting and file type exclusion; high speed scanning at the rated speed of most machines; high speed Tiff conversion for large or small document sets; high speed OCRing to capture text from image files; De-duplication and culling across different boundaries; search extracted text, meta-data and OCR'd text; unitize or doc-break documents for your specific need; and export to your litigation review tool – Concordance, Summation and many more.

The Early Data Analyzer module is a new component available with the LAW PreDiscovery 6.0 suite. This module offers a new workflow for dealing with electronic discovery to dramatically reduce the cost and time associated with handling large electronic discovery productions (LexisNexis, 2012). Early Data Analyzer allows users to search and cull data where it resides on disk without requiring the costly process in terms of time and disk space. Once the initial data set has been indexed and culled based on several available filtering mechanisms, a reduced data set can be passed directly to LAW for full expansion and production capacity. The Lexis Nexis claims that Early Data Analyzer helps users: to determine the size of the data set before importing it to the processing tools within LAW PreDiscovery, to avoid costly and time-consuming production of irrelevant documents, to reduce the risk of producing privileged data, and to evaluate risk and potential cost at the earliest possible point(LexisNexis, 2012).

The LexisNexis (2012) claims that Early Data Analyzer can save up to 80% of the time and costs typically involved in eDiscovery”. Also, the software can process between 15 to 20 GB of raw data per hour on average; and LexisNexis’s Early Data Analyzer is six times faster than native and full-text extraction and production performed later using LAW PreDiscovery. The litigation technology department of Bingham McCutchen LLP had also conducted beta testing of this application and it was a success and they were satisfied with the outcome of this product as the speed was remarkable, hitting as much as 20 GB per hour during loads, as well as the user interface of the product is easy to understand that a user can be running in just a matter of minutes (Silva, 2012).

3. RESEARCH DESIGN

In order to evaluate the system and collect real time data, we conducted the using both standalone LAW PreDiscovery and LAW integrated with Early Data Analyzer (EDA). The repeated measures also known as the within-subjects experimental design was followed, see Table 1. In this research model, there are two independent variables and one dependent variable. The independent variables or factors are the type of software which is standalone LAW or EDA integrated with LAW software, and the size of input data that will be processed during the test. The dependent variable is the time takes to complete the task by each type of software during the trials. The test data were obtained by using randomly selected groups of sample data files from real world cases. The extraneous variables used for this experimental research were file types which could have little or no effect on the experiment.

Table 1. Research Design

Subjects	Treatment: Type of Software	Observation: Time for processing
Group 1 (25 Test data cases)	Tx _a (Standalone LAW PreDiscovery)	Obs _a

	Tx _b (LAW integrated with Early Data Analyzer (EDA))	Obs _b
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The test data were collected from real life work environment, i.e. data processing vendors, litigation firms, and federal government. In real work place, one would normally receive files in Native format (.pdf, .xls, .ppt) or Raw data that need to be analyzed and process before loading the files into the SQL databases or any other type of relational databases that the company is currently using. The data samples included various types of files and were categorized as eDocs and eMails. Besides, the test data for this experimental research was randomly selected. The observed variable that is dependent upon the data input were time savings.

Table 2. The Sample Outputs from the experimental runs

	Time for processing using LAW PreDiscovery: Txa (Min:Sec)	Time for processing using LAW w/EDA Integrated Txb (Min:Sec)	Time Savings Obs1 (Tx1-Tx2) (Min:Sec)	Total File Size Obs2 (Mega Bytes)	File Types	File Count
Trial001	0:22	0:06	0:16	9.66	.ppt, .xls, .pdf	28 eDocs
Trial002	0:42	0:09	0:33	31.47	.msg, .html, .mhtml	39 eMails
...
Trial024	10:27	9:33	0:54	65.17 MB	.ppt, .xls, .pdf	224 eMails/Attachments
Trial025	0:57	0:43	0:14	8.23 MB	.msg, .html	17 eMails
MEAN	5:02	3:59	1:26			
SD	0.232036281	0.190	0.05			
Correlation Coefficient (Time savings vs Data size) = 0.874861156						

4. RESULTS AND DISCUSSION

Table 2 below presents results from a few sample trials that were conducted using both software: LAW PreDiscovery and integrated EDA with LAW. The first test run was conducted using total file size 9.66 MB of eDocs which contains 28 pdf/doc files. The outcome shows that first test run took 22 seconds using Tx_a and took 6 seconds using Tx_b, which resulted in 16 seconds in saving time. The second test was run for 15 emails with 16.2 MB in combined file size. With only LAW application, it took 42 seconds to upload into LAW database, and with LAW and EDA integrated solution it took 9 seconds to complete the task and the results revealed that there was a 33 seconds in processing time savings.

To further analyze the test results statistically, the means and standard deviations of Txa and Txb were calculated and presented in Table 2. Furthermore, the correlation coefficient was calculated to determine the relationship between time savings and the size of input data. Strong positive correlation, $r=.9$, is found between them. Figure 1 presents the pattern between time saving by data size.

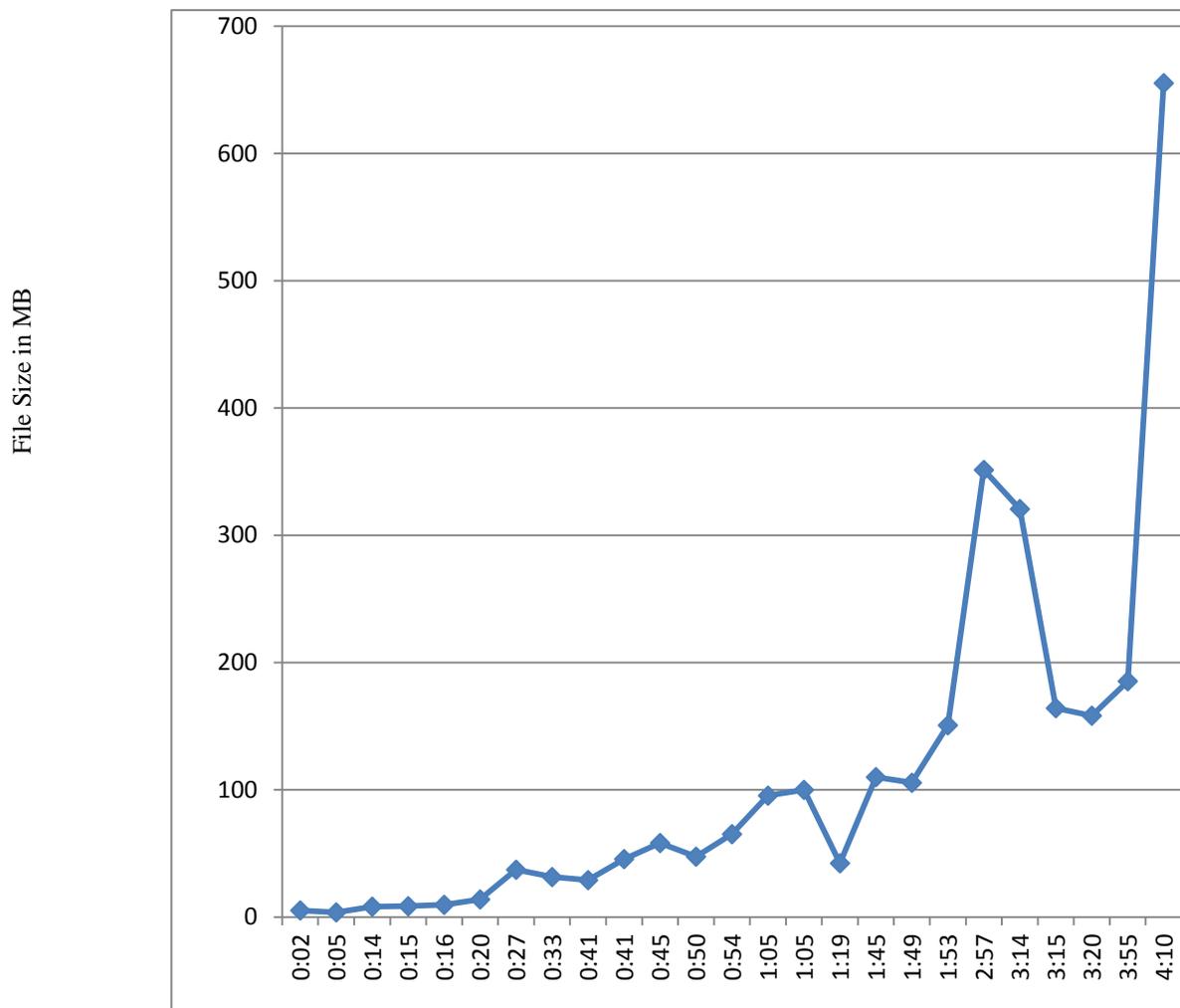


Figure 1. Time saving by file size

5. CONCLUSION

After examining the several early case assessment (ECA) products on the market, including software features and pricing models, the test results revealed the new product in development at the company called LexisNexis to be the best suited for most organization that are in need of processing volumes of data. By integrating early data analyzer by LexisNexis (EDA) and LAW PreDiscovery together, it would increase users' insight from start to finish of each case. As the amount of data maintained and stored in companies increase, it is most likely that the cost savings and benefits will increase as well. The product showed significant promise in reducing the volumes of data that require costly review. Therefore, if the decision is based on saving the cost and reducing the staff time

that is required for eDiscovery related tasks then implementing such products has high probability of being successful in the long run. It is safe to say that there will be reduction in data that needs to process depending on nature of the case and significant cost savings per case by using this tool. There are arsenal of tools that are in use today and some in development stage. Out of accessible ones, the tools that described here display good distinctiveness for eDiscovery industry and it is not a dire investment for such cost after all.

The expected advancement in technology and data explosion will result in more companies seeking for better technology and methods to achieve reliable solution. Smaller businesses with less sophistication technology may face more challenges responding to eDiscovery requirements. Limitations such as legal impositions, federal rules and economic implications are essential to include in the study for the future developments in this field. However, new technology could impose better flow of information and improve the civil justice system.

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The 2010 Code of best practices of Ghana: Issues, Deficiencies and suggestions

Otuo Serebour Agyemang*, Monia Castellini**

The 2010 Code of best practices of corporate governance of Ghana issued by the Securities and Exchange Commission of Ghana is irrefutably the most encyclopaedic guideline for good corporate governance practices in Ghana presently. It contains overarching provisions for effective corporate governance practices in Ghana. This paper reveals the vitally important issues in the 2010 SEC Code. Also, some of the deficiencies are highlighted in order to attract the necessary attention so that in case this Code is supposed to undergo some revisions and enhancements in the near future, these deficiencies would be appropriately addressed.

Keywords: Code of best practices, Corporate Governance, Issues, Deficiencies, Suggestions, independent non-executive directors, executive directors, Ghana

*PhD Candidate (Corresponding author)

Department of Economics and Management

University of Ferrara, Italy

Email: otuoserebou.agyemang@student.unife.it

Tel: 0039-348-992-19868

**Professor

Department of Economics and Management

University of Ferrara, Italy

Email: monia.castellini@unife.it

Tel: 0039-348-518-0164

1. INTRODUCTION

The Code of best practices on corporate governance in Ghana 2010, released by the Securities and Exchange Commission of Ghana is undisputedly regarded as the most encyclopaedic guideline for corporate governance practices in Ghana recently. Because of its extensive and comprehensive nature, there is little or no doubt that good corporate governance can be deepened in Ghana if corporate organisations adhere to its suggested guidelines. It was released to augment the already existing guidelines for good corporate governance namely; companies code 1963 (Act 179), Securities Industry Laws, 1993 (PNDCL 333) as amended by the Securities Industry Act, 2000 (Act 590) as well as the listing regulations, 1990 (L.I. 1509) of Ghana Stock Exchange (GSE).

The code was issued by the Securities and Exchange Commission (SEC) to corporate entities licensed under the Securities Industry Laws and the issuers of publicly listed securities specifically, those traded on stock exchanges. Its creation was essentially aligned with the principles of good corporate governance by the Organisation of Economic Cooperation and Development (OECD, 2004), the Commonwealth Association of Corporate Governance (CACG, 1999) and codes of best practices put forth by regulatory bodies in emerging and transition economies. It is basically designed to serve as “guidelines whereby the standards of governance in corporate bodies regulated by the Commission may be benchmarked”¹. As a result, the code is anticipated to be the minimum corporate governance guidelines required of publicly-traded corporate organisations in Ghana.

Aside this code, there are other two corporate governance guidelines that are in operation in Ghana: 1) the Ghana National Accounting Standards and Principles (GNASP), and Codes of professional conduct by the Institute of Chartered Accountants, Ghana (ICAG)- which are aimed at ensuring good corporate governance practice; 2) The manual on corporate governance of Ghana, which was sponsored by the International Finance Corporation (IFC)- and designed by Fintra consult, Ghana, Carl Bro Management, Denmark, and African Management Services Company (AMSCO), the Netherlands. This paper presents an extensive review of the provisions of the 2010

¹ See the preamble to the 2010 SEC Code of Ghana, pp. 12

Securities and Exchange Commission of Ghana's code of best practices. It highlights key issues that constitute the 2010 SEC Code. In addition, the main deficiencies of the 2010 SEC Code are illuminated with the idea that they would be taken into consideration if future revision of the 2010 SEC Code is to be undertaken. This is to ensure that the prevailing challenges facing companies in Ghana with regards to their corporate governance practices are addressed.

The remainder of the paper is organised as follows: the key features of the 2010 SEC Code are discussed in section 2. Section 3 addresses the deficiencies associated with the 2010 SEC Code. Lastly, section 4 concludes the paper.

2. KEY FEATURES OF THE 2010 SEC CODE

This section of the paper is addressed under four broad sub-sections as provided in the 2010 SEC Code: 1) Board-related issues- the separation of the roles of the CEO and Board chairperson, the responsibilities of the board, the responsibilities of the Board Chairperson, definition of independent directors, financial literacy of members of audit committees, annual performance assessment of the board, its committees, Chairperson and individual directors, and company secretary; 2) shareholder-related issues 3) Stakeholder involvement; and 4) Audit-related issues.

Board-related issues

Due to the relevant role boards of directors' play in insuring good corporate governance in corporate organisations, it is not all that astonishing to note that the 2010 SEC code of best practices focuses on the board as the main governance mechanism to ensuring effective corporate governance. First and foremost, the 2010 SEC Code provides for split of the roles of the CEO/Managing director and that of the Board Chairperson of the same corporate organisation. Accordingly, Section i(14) provides that "[t]here should ideally be a separation between the role of chairman and managing director/chief executive officer particularly in listed companies unless there are specific reason[s] which militate against such separation or as may be in the case of smaller corporate bodies, the cost of separation is uneconomical". In order to clarify the various roles of these topmost positions in a company, section i(18) provides that "[t]he [chairperson] should ensure that the board is in complete control of the corporate body's affairs and fully alert to the obligations to shareholders, industry and the law". However, the code does not clearly specify the role of the CEO but section i(16) provides that "[i]n the event of a separation of the two offices the relationship between the managing director/chief executive office[r] and the chair[person] and board as a whole along with their respective responsibilities should be formally defined".

Many corporate governance experts stress that it is crucial that the positions of the CEO/Managing director and the Board chairperson are split to ensure checks and balances. This approach is widely applied in the United Kingdom and other economies, particularly Commonwealth countries. Larcker and Tayan (2011) argue that corporate organisations that split up the roles of these two topmost positions stand the chance of benefiting. This is because, with this separation, corporate organisations can: unambiguously spell out the responsibilities of these two topmost positions; do away with conflicts in regards to CEO performance assessment, compensation packages for executives, recruitment of independent directors and long-term succession planning; and gives the CEO enough time to concentrate utterly on the corporation's business strategies, operations and culture (Larcker & Tayan, 2011). Millstein and McAVoy (2003) advocate that the separation of the two positions with an independent director as chairperson is germane to position the board as an objective monitoring and controlling mechanism. Pease and McMillan (1993) also postulate that in order to ensure objectivity by avoiding concentration of power in the hands of one individual, there is the need to separate the roles of the board chairperson and the CEO. The combination of the roles of the chairperson and CEO will lead to a compromise (finding the middle ground) between them, but their separations will enrich the board's independence while monitoring the CEO. Berghe and Levrau (2004) support the argument that agency theory endorses this separation thus reducing the supremacy of management on the board.

Even though the concept of a non-duality structure has been discussed for decades, it is only in recent times that it received attention as a practice from many countries. For instance, most companies in the US such as Aon, intercontinental hotels, Tenet Healthcare and Walt Disney Company have Non-Executive Chairpersons. The major arguments in favour of this idea stems from the fact that separating the two positions and selecting a Non-executive chairperson will heighten the capability of the board to monitor and control the actions of the CEO as

well as to function independently. Also, with the separation of these two positions, the board has a leader who is free from any interference that is considered to mar its solitary mandate to act effectively. This idea makes directors to feel more comfortable to act boldly to challenge the CEO on some decisions that are likely to affect the company. Furthermore, more often than not, capital providers prefer investing in companies with Non-Executive Chairpersons, and because of that, companies that have this type of system attract a lot of investors. Countries such as Germany, Switzerland, Holland and the Scandinavian countries have these two positions (CEO and chairperson) separated by law.

The split of these vitally important roles is not something new in Ghana in that this practice has been in existence for quite some years now. The companies code 1963 (Act 179), Securities Industry Laws, 1993 (PNDCL 333) as amended by the Securities Industry Act, 2000 (Act 590), SEC regulations, 2003 (L.I. 1728) as well as the listing regulations, 1990 (L.I. 1509) of Ghana Stock Exchange (GSE) provide for the separation of these two positions. However, the most planned with painstaking provision on this issue in Ghana is furnished in the 2010 SEC code. This is in line with the best business practices across the globe.

Secondly, the 2010 SEC code clearly states the responsibilities of board of directors. It is pleasing that the 2010 SEC code has overtly enumerated the objectives and responsibilities of boards of corporate organisations. Accordingly, Section i(1.a) clearly provides that “[t]he principle objective of the board of directors of a corporate body is to ensure that the corporate body is properly managed in order to protect and enhance shareholder value and to meet the corporate body’s obligations to: i) shareholders; ii) the industry in which it operates; and iii) the law. Also, it provides the primary responsibility of the board by spelling out that the board is responsible “for ensuring that good corporate governance prevail lies with the board of directors of the corporate body”². Furthermore, section i(3) of the 2010 SEC code itemises the principal duties of the board of directors to include: ensuring strategic guidance of the corporate organisation in keeping with its business goals; supervising the management and conduct of the corporate organisation; identifying risk and implementing strategies to manage it; succession planning and the appointment, training, compensation and replacement of top management; supervising internal control systems; and maintenance of the corporate entity’s communications and information dissemination policy/programme³.

It is informative that section (2) of the 2010 SEC code spells out the basic responsibility of the board that, it has to insure that good corporate governance prevails in the corporate organisation. In that case, the implication is that the board must not only insure that they operate in conformity with the tenets of effective corporate governance in their day to day operations, but must also insure that the tenets of effective corporate governance are in operation throughout the corporate organisation.

Thirdly, the 2010 SEC code of best practices clearly states the responsibilities of the board chairperson. Section i (17) highlights that the board chairperson should play an important role in securing good corporate governance within the corporate organisation. Also, the chairperson should insure that the board is in full control of the affairs of the corporate organisation and completely alert to the obligations to stockholders, industry and the law⁴. The code furthers to pointing out the functions of the board chairperson, which shall include; ensuring that the board meets frequently and that meetings of the board are carried out in an appropriate manner⁵; ascertaining the views and/or the decision of the meeting on the issues being deliberated⁶; ensuring that directors are incentivised to contribute within their respective capabilities in order to secure the maximum benefit for the corporate organisation⁷; being responsible for the directors receipt of both qualitative and quantitative information⁸; and ensuring that any non-executive director who is not contributing to board discussions is either not re-elected or requested to resign or is fired⁹. Section i (20) also points out that the board chairperson should strive to ensure that

² see section i(2)

³ See section i(3)

⁴ See section i(18)

⁵ See section i(19.a)

⁶ See section i(19.b)

⁷ See section i(19.c)

⁸ See 2010 SEC Code section i(19.d)

⁹ See 2010 SEC Code section i(19.e)

the board develops and implements a process for evaluating the effectiveness of the board, the contributions of individual directors and board committees.

The provisions of the 2010 SEC Code of best practices on the roles and responsibilities of the board chairperson are praiseworthy in that they are in line with international best practices. It is worth noting that Section i(17-19) of the 2010 SEC code clearly states an incontrovertible job description for a board chairperson and would offer as a point of reference for potential board chairpersons and a suitable memory stimulant for present chairpersons in corporate organisations in Ghana.

Fourthly, the 2010 SEC Code unambiguously defines who an independent director is. Much emphasis has been placed globally on the role independent non-executive directors play in ensuring effective corporate governance. Currently, Italy's corporate governance code, 2011, is debatably considered to be the only code that comprehensively defines who really an independent director is. Section 3.C.1 of Italy's corporate governance Code states that "[t]he Board of Directors shall evaluate the independence of its non-executive members having regard more to the contents than to the form and keeping in mind that a director usually does not appear independent in the following events..." if the person controls, directly or indirectly, the issuer via subsidiaries, trustees or third parties, or is able to exert over the issuer paramount influence, or partakes in a stockholders' agreement through which one or more individuals can exert a control or paramount influence over the issuer¹⁰; if the individual is, or has been in the previous three fiscal years, a substantial representative of the issuer, of a subsidiary having strategic relevance or of a corporation under common control with the issuer, or of a corporation or entity controlling the issuer or able to exercise over the same a significant influence, also jointly with others via a stockholders agreement¹¹; if the individual has, or had in the previous fiscal year, directly or indirectly a substantial commercial, professional or financial connections with the issuer, its subsidiaries, or any of its major representatives, or has been in the previous three fiscal years, a worker of the issuer, its subsidiaries or its major representatives¹²; if the individual receives, or has received in the previous three fiscal years, from the issuer or a subsidiary or holding corporation of the issuer, a considerable extra remuneration¹³; if the individual was a director of the issuer for not at least nine years in the last twelve years¹⁴; if the individual is vested with the executive director office in different corporate organisation in which an executive director of the issuer holds the office of director; if the individual is stockholder or quotaholder or director of a legal company belonging to the same network as the firm selected for the auditing of the issuer¹⁵; and if the person is a close relative of an individual who is in any of the positions listed above¹⁶.

Section i(23) of the 2010 Code has somewhat addressed the fundamental challenges pertaining to director independence definition. Juxtaposing the definition provided in the Italian corporate governance code regarding director independence definition¹⁷ with that of the 2010 SEC code of Ghana, it can be deduced that the 2010 SEC Code does not exhaustively provide the definition of director independence as witnessed in Italy's corporate governance code 2011. For instance, the director tenure and additional remuneration are not exhaustively dealt with by the 2010 SEC Code.

Fifthly, the issue regarding the establishment of an audit committee is explicitly stated in the 2010 SEC Code. Section i (46) lucidly state that every corporate organisation at which this Code is geared towards should strive to set up an audit committee. The primary functions of the audit committee are also unambiguously itemised¹⁸. Also, the authority of the committee is overtly enumerated in the 2010 SEC Code. For instance, the audit committee should: have the authority to carry out an investigation on any issue under its terms of reference¹⁹; be furnished

¹⁰ Italy's corporate governance code, section 3.C.1 (a)

¹¹ Italy's corporate governance code 3.C.I (b)

¹² Italy's corporate governance code 3.C.1 (c)

¹³ Italy's corporate governance code 3.C.1 (d)

¹⁴ Italy's corporate governance code 3.C.1 (e)

¹⁵ Italy's corporate governance code 3.C.1 (f)

¹⁶ Italy's corporate governance code 3.C.1 (f)

¹⁷ Italy's corporate governance code, section 3.C.1

¹⁸ See 2010 SEC Code section ii (46)

¹⁹ See 2010 SEC Code section ii (52.a)

with the necessary and sufficient resources it needs to conduct such investigation²⁰; and be furnished with full access to necessary and sufficient information²¹. Furthermore, Section ii (53) extends the committee's authority by stating that it should, with the consent of the board be able to solicit for external professional counsel if and when the need crops up. One aspect that 2010 SEC Code lucidly tackles is the adequacy of knowledge of committee members. Section ii (48) of the 2010 SEC Code unequivocally states that members of the audit committee should preferably be made up of directors with sufficient knowledge in finance, accounting and the fundamental elements of the rules and regulations under which the corporate organisation operates or is subject to. This is extremely relevant in that, if committee members perform their functions and authorities appropriately, the committee could play an auxiliary role in helping the board to execute its monitoring and controlling functions over the financial and accounting statements of the concerned corporate organisation.

Sixthly, the issue of director orientation and education is lucidly addressed in the 2010 SEC Code. Currently, board directors are faced with gargantuan challenges. These challenges are as a result of the growing number of shareholders' activism, varied backgrounds of board directors, changes in the environment they operate, practical changes of relevant regulations and shareholder growing knowledge about how corporations are to be governed. Since orientation to a new job is significant for optimal performance (Huse, 2007), corporations should make sure that upon director appointment, directors are ushered into the corporate organisation to make them aware of all the nitty-gritty in regards to how boards operate. Also, it is vitally important for board directors to take on refresher courses and training to make them become abreast with issues as and when they crop up within corporate organisations. These refresher courses and training will help directors to update their expertise and technical know-how. Section i (9-11) of the 2010 SEC Code has clearly made these orientation and training requirements obligatory for directors. Therefore, these orientation and training are no mere cosmetic, but official obligatory programmes in corporations.

Seventhly, Section i (20) of the 2010 SEC Code has tasked the board chairperson to ensure that the board put up some mechanisms that can be easily implemented to assess the effectiveness of the board, board committees and the contributions of individual directors. This recommendation, if properly executed will go a long way in helping to enhance board effectiveness of publicly-listed corporate organisations. This is because with this assessment, board directors will become more interested in corporate affairs in order to prevent an off-putting evaluation.

Eighthly, the 2010 SEC Code of best practices has categorically stated that companies should have company secretary as required under the companies code 1963 (Act 179)²². As a result, Section i (41) lucidly state that "[t]he company secretary should be a source of advice and guidance to the chairman and board on the implementation of appropriate corporate governance practices insofar as the workings of the board are concerned".

Shareholder-related issues

It is imperative that shareholders of corporate organisations are properly informed about how their companies are faring in the global market. Accordingly, the 2010 SEC Code has addressed this issue in toto by explicitly stating that boards of corporate organisations have to adopt and implement communication strategies that will enable their management to communicate, interact and broadcast information in regards to the direction, operation and management of the corporate organisation to all shareholders irrespective of their holdings²³. But it is worth considering that in order for shareholders to know what exactly are happening in their corporate organisations is dependent upon the quality of information corporate authorities convey to them. Accordingly, the 2010 SEC Code has unequivocally provided some mechanisms that are required to be implemented by authorities of corporations. These include: communications and reports by the board to stockholders must be in simple language, logical and consistent with previous annual reports²⁴; the information must be based on the principles of even-handedness, promptness, significance and candidness with substance regarded as priority²⁵; and annual reports supported by

²⁰ See 2010 SEC Code section ii (52.b)

²¹ See 2010 SEC Code section ii (52.c)

²² See 2010 SEC Code section i(40)

²³ See 2010 SEC Code section ii(68 & 70)

²⁴ See 2010 SEC Code section ii(71)

²⁵ See 2010 SEC Code section ii(72)

figures should strive to strike out a balance between the positive and negative facets of the operations of the corporate body for the period under review²⁶.

Currently, most shareholders are becoming more interested in seeing how their corporate organisations are helping/assisting other stakeholders in regards to the number of people their companies have employed, the kind of assistance their companies have accorded to the environment they operate in, issues of customer and supplier interests and other social responsibilities. Accordingly, the 2010 SEC Code has exhaustively addressed this issue in that, aside the financial information that the code directs corporate authorities to convey to shareholders, issues on non-financial information such as employment; environmental issues, social responsibility, and issues of customer and supplier interests are also to be communicated to shareholders by corporate authorities²⁷.

The issue of disclosure, transparency and accountability, which are hallmarks of effective corporate governance, are appropriately addressed in the 2010 SEC Code of best practices. The 2010 SEC has abundant provisions with regards to how board directors of corporate organisations are to be transparent and accountable to shareholders in carrying out their corporate responsibilities and roles. This will help solve the issue of information asymmetry whereby shareholders, who are owners of corporate organisations, are most at times left out when it comes to information sharing in corporate organisations. One major channel in which this can be done is via the copious reports which the 2010 SEC Code requires corporate organisations to put in order and send to their shareholders and regulators within the time frame specified by law²⁸.

Involvement of other stakeholders

The involvement of other stakeholders in corporate affairs has become an important issue in modern corporations as well as in the current corporate governance debate. The 2010 SEC Code has adequately addressed the issue of the involvement of other stakeholders in corporate affairs. Section i(1.b) of the 2010 SEC Code states that “[t]he interests of other stakeholders are relevant as a derivative of the duty to shareholders”. In this period where seismic activities, global warming, climatic change, wars, terrorist activities and so on, have become the order of the day, matters pertaining to environmental and humanitarian challenges have become teething concerns for corporate organisations and governments alike. It is thus pleasant that the 2010 SEC Code has not overlooked these issues.

Audit-related matters

Countries across the globe have introduced mechanisms to enhance the independency of auditors and to make tighter their accountability to shareholders (OECD, 2004). It is gratifying to note that the 2010 SEC Code has made provisions for an independent external auditor to ensure “that the audit of the corporate body is conducted in accordance with the generally accepted standards of auditing required by the Institute of Chartered Accountants (Ghana) of its members”²⁹. Also, the role of the external auditor has been overtly stated to include: he/she has to be the main source of an objective, independent, efficient and effective view on the financial statements of the corporate organisation³⁰; and he/she should adopt assiduousness, objectivity and independence in the discharge of his/her duties and responsibilities³¹.

The issue of external auditor’s independence has become a pressing concern to corporate governance experts across the globe. Most international best practices on corporate governance have addressed this issue. The OECD (2004) principle of corporate governance categorically states that:

Provision of nonaudit services by the external auditor to a company can significantly impair their independence and might involve them auditing their own work. To deal with the skewed incentives which may arise, a number of countries now call for disclosure of payments to external auditors for non-audit services. Examples of other provisions to underpin auditor independence include, a total ban or severe limitation on the nature of non-audit work which

²⁶ See 2010 SEC Code section ii (74)

²⁷ See 2010 SEC Code section ii(76)

²⁸ See 2010 SEC Code section iv (83.e)

²⁹ See 2010 SEC Code section iv (87)

³⁰ See 2010 SEC Code section iv (85)

³¹ See 2010 SEC Code section iv (86)

can be undertaken by an auditor for their audit client, mandatory rotation of auditors (either partners or in some cases the audit partnership), a temporary ban on the employment of an exauditor by the audited company and prohibiting auditors or their dependents from having a financial stake or management role in the companies they audit. Some countries take a more direct regulatory approach and limit the percentage of non-audit income that the auditor can receive from a particular client or limit the total percentage of auditor income that can come from one client.

Although not all the provisions that have been stated above are in the 2010 SEC Code, it is worth noting that the most important of all the provisions, if not arguable, has been unambiguously stated in the 2010 SEC Code. Section iv (92) states that “[t]o ensure the continued effectiveness of the audit, personnel including the audit partner should be regularly rotated or changed to enhance fresh approaches to audit work”.

It is to a certain extent clear that the 2010 SEC Code takes the glory for being the most all-inclusive guideline currently in operation in Ghana. Obviously, attempts were made to make sure that its provisions are in accordance with the OECD principles of corporate governance, the CACG principles of corporate governance and best practices of corporate governance in other emergent and transition economies. Therefore, the above discussion provided key issues which are considered as the key strengths of the 2010 SEC Code. Undoubtedly, there are other important provisions in the 2010 SEC Code, but those this paper has painstakingly discussed are considered the most significant provisions. However, the 2010 SEC Code has its deficiencies and these are discussed in the next section of this paper.

3. DEFICIENCIES OF THE 2010 SEC CODE

There are some deficiencies associated with the 2010 SEC Code of best practices of Ghana. For the purpose of this paper, these deficiencies have been grouped under four main sub-headings namely; provisions that lack clarity; substandard provisions; unqualified dereliction; and common gaffes.

Provisions that lack clarity

There are some provisions in the 2010 SEC Code that lack clarity and therefore, become confusing. Some of them conflict with other provisions of the 2010 SEC Code. Firstly, there is no clarity in regards to the enforcement mechanism provided by the 2010 SEC Code of Ghana. In one instance, the 2010 SEC Code appears to gear towards the “comply-or-explain” model of corporate governance code enforcement, which has become widely-liked or appreciated worldwide³². This is typified by the provisions of sections i (14), i (15), ii (51.d), iv (90) and v (94), which require corporate organisations to declare the extent of their compliance with the 2010 SEC Code. However, the 2010 SEC Code also gears towards the professed “rules-based” technique of corporate governance code enforcement³³. This is typified by the application section of the 2010 SEC Code, which states that “[t]he Code of Best Practices on Corporate Governance will apply to all corporate bodies approved or licensed as stock exchanges, dealers and investment advisers under the Securities Industry Law, the managers, operators, trustees and custodian of unit trusts and mutual funds and the issuers of publicly traded securities”. If the Code specifies the minimum guidelines of corporate governance, it means that compliance is obligatory and penalties go along with non-compliance. Another cogent evident that the 2010 SEC Code gears towards obligation are the provision of section iv (98), which requires that:

The annual report should contain a statement from the board as to the degree of compliance of the corporate body with regulatory and other legal requirements governing its operations and the extent to which statutory payments have been met in respect of the period under review.

Secondly, it is quite fastidious to determine the actual number of documents that the 2010 SEC Code requires from corporate organisations. An effort to determine the documents requires a searching of the whole range of the

³² This model is widely used by the European Union.

³³ This is evident in the Sarbanes-Oxley Act, 2002 of the United States of America

provisions of the 2010 SEC Code. The documents are not jointly listed; instead they exhibit an unpolished style in a baffling vague manner. Certain documents that corporate organisations are supposed to present under the 2010 SEC Code include documents, which are required to be included in their annual reports. Some of these documents are; the corporate governance practices report³⁴, material foreseeable risk factors³⁵, Chairperson's statement on the performance of the corporate organisation³⁶, board's statement on the acceptance of responsibility of all information contained in the annual report³⁷, management fees³⁸, identities of shareholders and the degree of their holdings³⁹, associated party transactions⁴⁰, incentive schemes details⁴¹, fees paid to auditors for audit and non-audit activities⁴², issues pertaining to employees and other stakeholders⁴³, and a statement stating the level of compliance with the corporate governance practices as specified in the 2010 SEC Code. Some other documents that the 2010 SEC Code requires of corporate organisations are the creation of a business code of ethics⁴⁴, its formulation⁴⁵, its monitoring adherence⁴⁶ and issues regarding the development of the Code of Ethics⁴⁷. In some other cases, it requires a considerable effort to ascertain whether a document should be considered single or multiple. For instance, Section iv (102) requires corporate organisations to have their own Codes of Ethics and Statements of business practices, which should be executed as constituent of their corporate governance practices. It is unclear whether a company's statement of business practices and its Code of Ethics form a single document or multiple documents.

Substandard provisions

There are a number of remarkable provisions in the 2010 SEC Code of best practices, which are substandard in their current state and thus deficient in accomplishing the actual reason for having them. As mentioned earlier, it is praiseworthy that an unambiguous, gentle, modern and detailed definition of the expression "independent directors" can be noticed in the 2010 Code of best practices⁴⁸. However, the wonderment of this definition arises when one attempts to decipher the rationale for this provision. If there is a provision that requires independent directors to sit on boards of corporate organisations, but does not explicitly state the roles and responsibilities that these directors are to play, then it will lead one to wonder about the rationale behind this provision. Furthermore, the actual number of such directors who are obliged to sit on boards of corporate organisations is not significant. Because of this, it would definitely be a sheer utopian thinking for us to expect these directors to make any meaningful impact on board decisions that will eventually have influence on firm performance. In other jurisdictions, their Codes for best practices require these directors to form the majority on the board⁴⁹ or half of board members are made up of these directors⁵⁰. Also, some of the Codes around the globe also require that major board committees such as the audit committee⁵¹, remuneration committee⁵² and nomination committee⁵³, are to be entirely made up of independent Non-executive directors.

³⁴ See 2010 SEC Code section v(99)

³⁵ See 2010 SEC Code section v(95)

³⁶ See 2010 SEC Code section v(94)

³⁷ See 2010 SEC Code section v(96)

³⁸ See 2010 SEC Code section v(101.a)

³⁹ See 2010 SEC Code section v(101.b)

⁴⁰ See 2010 SEC Code section v(101.d)

⁴¹ See 2010 SEC Code section v(101.e)

⁴² See 2010 SEC Code section v(101.f)

⁴³ See 2010 SEC Code section v(101.g)

⁴⁴ See 2010 SEC Code section vi(102)

⁴⁵ See 2010 SEC Code section vi(103)

⁴⁶ See 2010 SEC Code section vi(104)

⁴⁷ See 2010 SEC Code section vi(105)

⁴⁸ See 2010 SEC Code section i(23)

⁴⁹ UK Corporate Governance Code 2010 s.B.1.2; Malaysian Code on Corporate Governance 2012, recommendation 3.5; and Australian Corporate Governance Principles and Recommendations 2010, recommendation 2.1. .

⁵⁰ See Code of Corporate Governance for South Africa (King III Report) s.2.18

⁵¹ See UK Corporate Governance Code 2010 s.C.3.1; Indian Corporate Governance Voluntary Guidelines 2009 s.III.A.; Finnish Corporate Governance Code 2010 recommendation 26; and Code of Corporate Governance for South Africa (King III) 2010 s.3.2.1

⁵² See UK Corporate Governance Code 2010 s.B.2.1; Finnish Corporate Governance Code 2010 recommendation 29; and Indian Corporate Governance Voluntary Guidelines 2009 s.I.A.3 (i).

⁵³ See Finnish Corporate Governance Code 2010 recommendation 32; and UK Corporate Governance Code 2010 s.D.2.1

Secondly, as mentioned earlier, the knowledge hiatus pertaining to finance, accounting and basic elements of the laws has been adequately addressed in the 2010 SEC Code⁵⁴. However, the current state of Section ii(50) has the propensity to prevent whatever benefits Section ii(48) is yearning to accomplish. Section ii(50) has the tendency of resulting into a situation where corporate organisations' finance directors will find their way back on to their audit committees. With this oddity, finance directors will be required auditing themselves. It will be called to mind that section i(47) stipulates that the majority of the membership of the board audit committee should be made up of independent Non-executive directors. It can be argued that there is a deficiency in Section i(47) of the 2010 SEC Code of best practices. Best practices around the globe require the audit committee to only consist of independent Non-executive directors⁵⁵. Therefore, the possibility of Finance Directors to be on audit committees is absent. Until section i(47) is amended to mirror the very reason it was suggested, the Securities and Exchange Commission has to be watchful to ensure that corporate organisations are not transmogrified into worse situation even before the creation of the 2010 SEC Code of best practices: that is, permitting Finance Directors to sit on audit committees' meetings.

Thirdly, the provision of Section iii(68) requires the board "[to] adopt and implement a communications policy that enables management to communicate, interact with and disseminate information regarding the direction, operations and management of the corporate body to shareholders, stakeholders and the general public". Section iii(69) furthers that "[i]n the case of listed corporate bodies the policy with regard to shareholders and the general public must be governed by the concept of timely and continuous disclosure". It is quite surprising that even with these provisions, a lot of listed corporate organisations fail to make their reports available on their official websites. This problem stems from the fact that the 2010 SEC Code has not got a definitive medium of communication for companies to publish their annual reports. The Securities and Exchange Commission will have to make sure that this is enforced.

Unqualified derelictions

Although there are wide gamuts of provisions in the 2010 SEC Code, there are some vitally important abandoned provisions that should have been integrated into it. Firstly, there are two broadly accepted groups of directors in a corporate organisation: executive directors (consisting of management) and Non-executive directors (consisting of outside directors). Whilst the executive directors can organise meetings separately, there is no provision in the 2010 SEC Code that officially approves that Non-executive directors are also entitled to organise separate meetings. These meetings are generally referred to as "executive sessions"⁵⁶. These "executive sessions" are vitally important in the sense that there are certain provisions in the 2010 SEC Code, which designate explicit roles and responsibilities to only non-executive directors⁵⁷. If certain provisions are not stated in the 2010 SEC Code for such meetings, any effort for non-executive directors to organise such meetings separately will be welcomed with some suspicions from the executive directors.

Secondly, as mentioned earlier, section i(14) of the 2010 SEC Code categorically state that "[t]here should ideally be a separation between the role of chairman and managing director/chief executive officer particularly in listed companies unless there are specific reason which militate[s] against such separation or as may be in the case of smaller corporate bodies, the cost of separation is uneconomical". The 2010 SEC Code further states the functions of board chairpersons of corporate organisations. However, there is no provision in the 2010 SEC Code that clearly states the roles and responsibilities of CEOs of corporate organisations. Without clear-cut responsibilities of the CEO in the corporate organisation, the probability that some conflicting issues will crop up between the CEO and the Board Chairperson is high. If some provisions are not lucidly stated in the 2010 SEC Code, any attempt for board of directors to perform their functions as monitors and controllers will prove frivolous in that, the CEO will consider such monitoring as sabotaging.

⁵⁴ See 2010 SEC Code section i(48).

⁵⁵ See US Sarbanes-Oxley Act 2002, s.301(3); UK Corporate Governance Code 2010 s.C.3.1; Code of Corporate Governance for South Africa 2010 (King III) s.3.2.1; Singapore Corporate Governance Code 2005 s.11.1; Indian Corporate Governance Voluntary Guidelines 2009 s.III(A); and NYSE's Listed Company Manual 2003 s.303A.07(b).

⁵⁶ "Executive sessions" refer to meetings of the non-executive directors whereby executive directors intentionally left out. See, UK Corporate Governance Code 2010, sec A.4.1; Brazil's Code of Best Practice of Corporate Governance 2009, sec 2.11; Indian Corporate Governance Voluntary Guidelines 2009, sec I.B.3; and NYSE Listed Company Manual 2003 (as amended), sec 303A.03.

⁵⁷ See 2010 SEC Code section i(28)

Thirdly, the 2010 SEC Code fails to define some terms. For instance, “cross shareholdings”⁵⁸ and “key executives”. The needfulness to have these terms explained cannot be overlooked. Inasmuch as 2010 SEC Code has a section dedicated to explaining technical terms, it would be proper to explain the terms there. If the term “executive” could be explained in that section of the 2010 SEC Code, then there is no excuse to rationalise the non-explanation of these terms.

Common gaffes

The 2010 SEC Code is not excellent and delightful in all respects. It is characterised by some gaffes. Firstly, it has typographical and grammatical errors such as, improper use of punctuations such as hyphens⁵⁹ and omission of semi-colon⁶⁰. Secondly, the 2010 SEC Code is also characterised by poorly constructed phrases which confuse the actual substance of the provision in which such blunders occur. For instance, the expression “body corporate”⁶¹ could have been properly expressed as “corporate body”. Also, the expression “should be accompanies” in section iv(92) could have been properly expressed as “should be accompanied”. The expression “with an his capacity” in section i(23.f) could have been appropriately expressed as “with his capacity”. Furthermore, the expression “good corporate governance prevails lies”⁶² could have been properly written as “good corporate governance prevails lie”.

From the aforementioned discussion, it can be argued that these common gaffes do not nullify the importance of 2010 SEC Code, but they taint its prominence. It is of extreme relevance that executive, legislative or regulatory instruments are appropriately constructed so that they would be able to communicate the required messages as any mishap could have serious upshots.

4. CONCLUSIONS

The discussion above undoubtedly reveals that the 2010 SEC Code of best practices of Ghana has the propensity to positively influence corporate governance practice in Ghana. This is because of its extensiveness, comprehensiveness and its compliance with the best practices across the globe. The issue of enforcement of its provisions is currently the pressing concern in Ghana. Despite some deficiencies in regards to its provisions as illuminated in the above discussion, the 2010 SEC Code still remains the most encyclopaedic guideline for good corporate governance in Ghana presently. The highlighted deficiencies of this Code are to attract the necessary attention so that in case the 2010 SEC Code is to go through some revisions and enhancements in the near future, these shortcomings will be appropriately addressed.

Also, it is worth considering that since the effectiveness of the 2010 SEC Code is dependent upon how regulatory bodies-such as the Securities and Exchange Commission and the Ghana Stock Exchange-ensure its enforcement, these bodies are supposed to make sure that the provisions of this Code are appropriately reviewed always in order to take into consideration the development of new ideas in corporate management. Furthermore, it is required of these regulatory bodies in Ghana to assist corporate organisations in their striving to comply with provisions of the 2010 SEC Code. In addition, these regulatory bodies have to make sure that there are sufficient communication, educational symposiums, seminars, workshops and other equally important educational opportunities to all stakeholders of corporate governance. Lastly, in order to ensure effective enforcement of the provisions spelt out in the 2010 SEC Code, the enforcement and monitoring divisions of these regulatory bodies must work assiduously. If these regulatory bodies are lethargic in exercising their duties and responsibilities, the 2010 SEC Code will be but a sheer epistle, dead epistle, we mean. Therefore, it is incumbent on these regulatory bodies to ensure that the provisions that are unambiguously spelt out in the 2010 SEC Code are effectively implemented.

References

⁵⁸ See 2010 SEC Code section v(101.c)

⁵⁹ See 2010 SEC Code section i(19 and 23)

⁶⁰ See 2010 SEC Code section i(19 and 23)

⁶¹ See 2010 SEC Code section vii(106)

⁶² See 2010 SEC Code section i(2)

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Business Complexity & Its Salient aspects-Influencing Sustainability

J.A. Kulkarni
ASM Group of Institutes Pune

ABSTRACT

The Business World today is troubled by the inertia in the system which is due to the complexity that each business has itself created over the previous few years or decades .In view of the market opportunities and the corresponding threats to business survival, since the time the globalization of business, every major player has under taken to expand its business through new product launches and through inorganic business acquisitions(M&As).and entering in to hither too un touched, un known market segments both in domestic & global markets

,This has necessitated multi product, multi locations, and multi market segments, multi cultural integrations, multiple management practices resulting in to a highly dense cobweb of business complexity. This severe complexity has been restricting creativity and innovat5ion based progress since all the major resources of the organization are busy& preoccupied in resolving issues arising due to organizational complexity management.

It is a matter of fact that major global organizations are now busy clearing the 'complexity-mess' they themselves have created in the recent past- through establishing cross functional teams to meticulously unwind the complexity cob web. Unless this complexity management (reducing complexity) is done on top most priority the business houses will face their being left out of the volatile global markets.

This paper attempts to explain various areas of the business which are saddled in the complexity conundrum and while developing a cause- effect correlations between actions taken by the business and the resulting complexity. Also an honest attempt is being made to recommend certain quick- fix recommendations for alleviating the 'drag' due to business complexity. The case studies & examples included in this paper are based on the author's personal experience during his near 40 years of industry experience in India and abroad and the narration is based on the situations which existed during these years. However, wherever possible due care has been given to the changing business strategies adopted during the past decade by the industries in general to compete in the globalised market scenario.

The scope of the paper is restricted to business organizations in the public domain and therefore issues of complexity in the general environments such as economic upheavals due to national & global economic policies are kept outside the purview of this paper.

The observations made in this paper are author's personal views and are intended for the purpose of narration of main theme and therefore there is no implicit or explicit intention to criticize any individual or an organization.

BUSINESS COMPLEXITY - (B-COMPLEX)

The Nature and Type.

Business complexity is considered as an issue if there is a loss of rhythm in the business processes, causing undue delays in delivery commitments, in making business decisions, loss of efficiency at crucial phases in project management, unobservable mix ups in materials management & logistics and resulting in noncompliance to product specific modifications due to regulatory norms etc

Normally in a single product & few clients situations the decisions are expeditious and commitments to cost, quality & time are manageable. But when the business enters in to multi product, multi market segments, with product mix and market mix issues needing appropriate planning and scheduling techniques, there is a tendency to provide for commonization/standardization of raw materials, processes, logistics, product/process costing & pricing, including clubbing of functional responsibilities .In this process there appears a tendency towards lack of alertness in avoiding the very genesis of complexity which later hits back as challenges/hurdles in the smooth flow of major business processes.

There are different types of business complexities depending on the nature of & the size of the business expanse. This of course has to include all the stake holders and their interests in the main business. The understanding and analysis of business complexity calls for a very detailed review of the business processes including the very purpose of the business when it started its operations and the subsequent iterations carried out consciously or unconsciously over a period of time. The ever dynamic business environmental factors and awareness or the lack of these changes in relation to the path followed by or decisions taken by the business leaders at different times will be of major help in understanding, the beginning and the current status, of business complexity. The more the continuity of the stake holders in a particular business the more easier it will be to find out the root causes of the business complexities.

On a very broader scale we can classify the types of business complexities as:

1. **Business economics** related.
2. **Technological changes /interventions** (both in products& processes)
3. **Social needs related** (The influencers on the business environment both inside/outside)
4. **Regulatory& Corporate Governance&CSR obligations**
(Environmental controls, trade and tariff barriers Corporate Governance& CSR interventions etc.)
5. **stakeholders' interests/demands.**

We may now decide to study each of the above aspects w.r.t 'Complexity Management.'. However we have to keep in mind the overlapping effect between the above facets of business complexities to avoid confusion in the appropriation of each one as 'causative.

1.BUSINESS ECONOMICS COMPLEXITY(FINANCIAL)- (F):

This includes all the aspects of the business which aim at maximizing its ROI right from launch of the business enterprise to every phase of the 'Life cycle' of the business entity, and the strategic decisions made and implemented towards sustenance of business and its economic interests.

In the normal terminology by business economics we mean the way in which a business manages its economic needs and results, It includes management of capital costs, margins and its investment requirements in the economic terms.

In the initial stages of a business venture, the conversion process of a business idea in to a commercially beneficial project and arranging for all the capital requirements in this process take priority over other long term perceptions. Preparations of truthful viability projections and sincerity of purpose in the implementation of the business proposal to a great extent help avoiding 'slippages' on the way to project implementation.

However the entrepreneurial anxiety, and the fear psychosis of likely delays affecting the project tend to force the businesses to bend backwards and cut corners on many aspects from product design to customer relations. This is obviously the point from where onwards the strategic drift and the seeds of business complexity are sown in to the organization. In the embryonic stage itself the congenital

deformities start appearing in the otherwise healthy entrepreneurial venture. In order to get rid or to avoid the red tape the sacrifice of 'Values' becomes a prerequisite.

As the organizational life cycle status shifts from the embryonic stage to the 'toddler' situation, the urge to excel or grow after the gestation period the business is tempted to explore ways to grow its financial muscles by investing further in areas which are in conflict with the competitive forces.(Michel Porters 5-forces Model of competition).The demand on the economic feasibility are very severe at this stage any wrong habit inculcated at this stage in the financial management of the operations of the enterprise may lead to catastrophic consequences for its long term survival.

The closures of many businesses at this 'pickup' stage is seen so obviously around in any Industrial estate, anywhere in the world as a consequence of adopting incorrect ways of handling the economics of these ventures. The near graveyard situation of SMEs closing shops at most of the MIDCs is an indication of failures of the concerned entrepreneurs in managing business economics complexities confronting the businesses.

As the industry grows to the stage of stability (Incase it is successful in negotiating the hurdles of business complexity at the growth stage), there are major responsibilities towards 'Business Sustenance' amidst management of growth through both organic and inorganic means. This is where the realistic 'Competitive Capabilities' of the business are put to acid tests. This where factors such as 'catch up fast' 'Make Hay when the Sun shines' start working seriously on the minds of business leaders.

Aspects such as maximizing market share, business growth thro' acquisitions in both related and unrelated areas, diversifications & expansions, conglomerate integrations etc are at the top of the agenda for the strategic planners of the business enterprise. While this hectic is understandable at the growth stage of the enterprises, hasty and uncalculated risk factors, including over or underestimation of the business 'Drivers and its Critical Success Factors' lead to serious regrets and business complexities at later stages of implementation of these growth strategies. There will be serious drain/strain on the economics of the business due to unmanageable borrowings, and difficult to manage market forces. The ever increasing rates of failures of business mergers and acquisitions (The success rates of M&As, across the globe are around 20-25%max) are indicators of unsound business decisions, unforeseen complexities in manageability of the merged entity.

The not so distanced examples of the economic meltdown and catastrophic scandals and 'lost sight situation' in globalised market economics, such as the famous sub prime lending, The Lehman Bros. the sinking Euro Countries economics. The rising state level debts, due to bailout supports, are again reminders of 'Things Gone Wrong'(TGW) basically due to lack of clarity and foresight in to the complex nature of global business.(the B-complex Effect)

2. TECHNOLOGICAL CHANGES-COMPLEXITY-(T)

Now let us look into the unfathomable nature of Business complexity due to Compulsory and voluntary aspects of technological changes brought about in the Product and Processes of business paradigms including the regulatory requirements of environmental protection, and other social and neo political reasons asking for Technological Changes in the Product & Processes in Business situations

.There are basically two types in the Technological Changes

1. The Induced Change (The normal/natural Change)
2. The Compelling Change (The forced change to ensure survival against competition/consumerism)

The changes in the technologies of products and services due basically to increased awareness of natural resources, and improvement due to scientific researches innovations and discoveries in all aspects of life on the planet Earth can be classified as Induced technological changes. The changes leading to improvements in the longevity of life and better processing of the natural resources, leading to better quality of life and the related changes in the understanding level of the surrounding habitat and similar could be grouped as Induced changes.

So far as these efforts lead to meeting the basic needs of food clothing and shelter and even to some extent of the social, hierarchical & self actualization needs, the changes are within the Induced change category. Each of these induced changes could be graded as Ethnic-Traditional –Conventional – Contemporary types of changes. The transition from one stage to the next level of changes, besides the absolute necessities, certain changes which were purely linked to social status & competitive advantages may have induced complexities, leading to detrimental or side effects which call for rethinking and redressal of original performance parameters and in- gradients of the products & services. The fat free food, emission controls on automobiles, restriction on certain medicinal formulations etc, are indicators of such alterations leading to complexities in the purpose of business and steps taken which may not necessarily avoid the detrimental effects of such products and services.

The compelling Type of Technological Changes have in majority focused on areas of personal consumptions and social status needs . The advents in fast foods, cosmetics & fashions, the personal ward robes, the ‘buy /avoid me if you can’ type of temptuous products & services, the various social media related communication techs, have created compelling needs for products & services which even though create convenience/comfort feelings in life, are likely to create conflicts & confusions between the natural instincts & compulsive instincts of need satisfaction. Today the permissive & promiscus ways of life in so called super advanced societies are also the promoters of crime, violence and terroristic tendencies all across the globe. These compelling technological overtures have also lead to newer diseases, & epidemics, and created competition between the obviously detrimental V/S the life supportive products & services, While in many instances it is the the first to market & basic survival necessities for business ventures to innovate new products & services, it is this greed or fear which is the originator of many complexities in managing businesses drifting far away from their original business purposes & the honest generic strategies.

The above two types of technological changes are very broadly seen as perpetrators of to days’ agonies and ecstasies in our societies around the world. And the speed & spread of these maladies is facilitated by advent of faster modes of communication & commutation .May be we have lost track of the very purpose of life on this planet , and find ourselves busy in being a proud member of the other wise ‘man eats man’ kind of complex business purposes and priorities, drifting endlessly in self supportive visions of progress and prosperity

We may for the sake of our discussions name these technological changes as TC.

3. CHANGES IN SOCIAL ORDER-COMPLEXITY:

These types of variations in our social strata are basically due to 1.Demographic changes(Demographic dividends) .2. Cross cultural Infusions in search of newer and newer market segments for products and services.3.Exploitations of natural & man made resources for ego(under the garb of social emancipation) satisfaction based on greed and need satisfaction.

The aspects of demographic changes over the centuries has been basically due to commercialization of geographically strategic vantage points(demographic dividends). This of course has been the main

reason for the disguised sense of open market approaches of several focal locations. Even though this initially appeared like a great opportunity for cross cultural interactions has resulted ultimately in grossly compromised and constrained social order .People who migrated for the sake of opportunities for higher education and brighter careers to so called developed countries, invariably experience and strongly feel the absence of social support in these countries to which they migrated basically in search of happiness & are never accepted as original but second class citizens of the host countries. These same people disillusioned for the sheer lack of sense of true belongingness are trying to correct their steps too late in time by wanting to return to their ancestral societies, but face greater difficulties since their allegiance to alien cultures and pathologized social behaviors compelled by the forces asking for compliance to foreign and definitely not so homely social environments. Today in almost all nooks and corners of the globe we see hundreds and thousands of people having lost their originality and fellow feeling. They feel absolutely insecure due to lack of ownership and welcome by their own ancestral social groups. There are millions of parents who feel the absence of their sons and daughters who stay far away in alien societies, feel like orphans at the later stages of their life .Every thing in their interactions with such long distanced relations looks artificial and full of doubts and pretensions.

Now the cross cultural Interactions or Integrations as much spoken about & lectured as signs of social progress are manifestations of false assurances of well being, purely motivated by commercial & business considerations .Howsoever any one can try to claim optimizations of cross cultural interactions it is a matter of fact situation that all aspects of measurements of such an integration are attempts to brow beat the mere under currents of situational adjustments and not in any sense cross cultural integrations. At the core every one feels alienated from his free will behavior sense of loss of touch with his/her origins. This is a reality and such societies are brimming with sense of discontent which the social psychologists for their business needs attempt to superimpose with lectures & research papers claiming that all is well, with societies where in heterogeneous cultures are conditioned by circumstances to stay and work together. The ever escalating fights for rights to free will behaviors and demands for equanimity in social order& social strata, culminating in terrorism. Naxalism ,Fundamentalism are few examples of disturbance and complexity in the societies all across the globe today.

The aspects of Creativity & Innovations leading to discovery of newer products & services when driven purely by business & commercial considerations without much attentions ultimately to improved self esteem and feeling of real progress by the societies. lead again (Exceptions could be Innovations in the field Medicine & Health Sciences) to promotion of consumerism, false sense of social status, and further alienate the haves from the have-nots. The bitter wars on the business fore fronts in the fields of social media& net working are examples which will make the common man run crazy & bewildered, due to complete break down in human relations and cultural fits. Today due to compulsive marketing forces enabled by higher compensation levels nearly 80% of the energies of the societies are focused on looking good rather than feeling good .And the balance 20% of the energies are spent in regaining the lost balance and peace of mind due to wanting to be socially acceptable (The elite complexity).

4. REGULATORY,CG&CSR OBLIGATIONS PEOPLE_PROCESSES-COMPLEXITY(P)

As an after effect of the atrocities happening due to quest for business survival, we tend to deplete the intrinsic supportive and protective aspects for life on the universe. Over the previous several decades in our quest to speed up social & business contacts and communication, with thorough disregard to the environmental limitations, have rendered life on this planet vulnerable to extreme climatic changes& un predictive catastrophes all across the globe. Perhaps there has always been a short sighted commercial approach to all the product & process Innovations, in all walks of life. Today we are frequently

confronted with situations which could have been avoided incase a real long term impact on our lives and the planet was factored in the Innovations& their implementations.

We see near chaos all around us for environmental degradation, fear of unmanageable dangers of nuclear energy ,the escalating fuel & food scarcities ,near extinctions of useful flora & fauna, uncontrolled consumerism leading to debt crisis putting countries and nations at the risk of loosing their sovereignty and existence. plagued by indiscrete terroristic strikes and kidnaps, the drug mafia, collapsing social values etc.

There is therefore an extraordinary effort in bringing about regulations and restrictions by the global economic super powers to contain the damage and resurrect certain orderliness all around. These regulatory controls lead to self protective behavior which work as obstacles in smoother implementations of the regulatory norms prescribed.

An escapist route against such norms leads to corrupt practices to counter the regulations. Non compliance to financial norms lead to sudden collapse of fiscal discipline(The Lehman bros & The subprime lending fiasco). Non compliance to environmental control norms have lead to the erratic climate Changes and the danger of the green house effect which may lead to serious health problems to life on the planet earth. The loss or extinction of various life species is a clear indication of erosion of life supporting environment for these species on earth. This has lead to complexity in the basic life cycle & survival of all forms of life. The fight for territorial controls to secure ones own interests has manifested into civil wars in many countries basically triggered by interested powers to retain or gain control on scarce resources such as crude oil, navigational nodes etc. The web of monopolistic controls is being spun around such commercially strategic locations around the planet by the super powers for selfish needs.

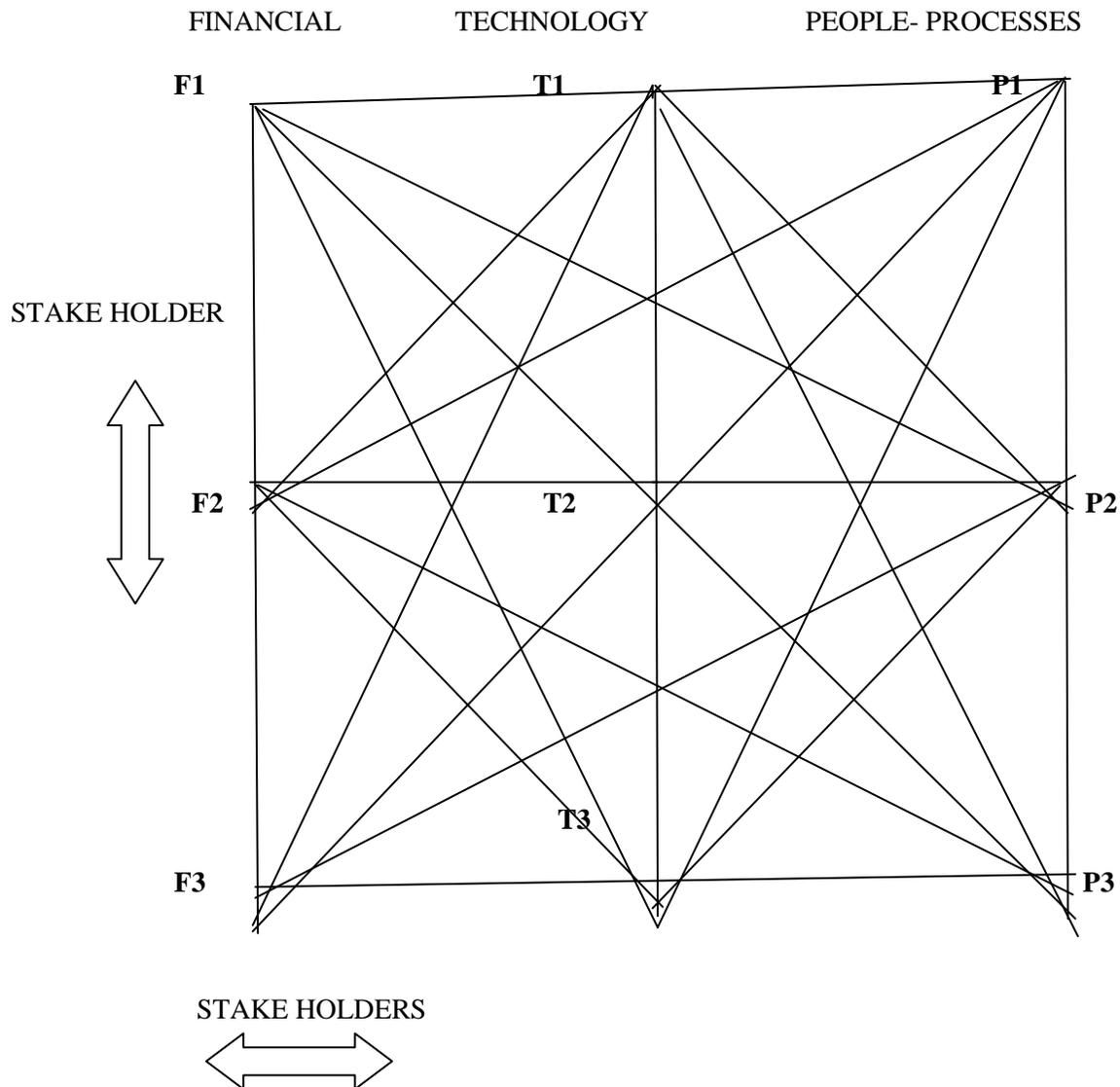
5. ALTERED STAKEHOLDER INTERESTS& DEMANDS- COMPLEXITY

This one of the main aspects or factors leading to the Creation. Nursing, and supporting the 'Complexity' over periods of false evolutionary aspirations of the vested business interests. Whether consciously or unconsciously, organizations have created complex situations in all their efforts to maximize stakeholder interests. Of course the role play is not that easy for any business, attempting to survive in business mainly by ensuring stake holder satisfaction. It is akin to the role played by the Ring Master in a circus surrounded by hungry lions and tigers in the form of stakeholders, and to make them behave less violently and maintain semblance of order is always a difficult task for any entrepreneur.

Businesses are compelled by the constant threats in the environment, to find out short cuts, which even though in the long run are ruinous , and complex to mitigate consequences are essentials to ensure stability however short term it could be. The products & processes adopted to meet customer needs both in performance and affordability terms have given way to disastrous complexities of environmental degradations, health hazards, malpractices such as hiding the risks of usage etc, corrupt approaches to subdue impacts of scandalous practices in financial & quality of services, have left every stake holder severely abused and bruised with unseen prospects of comfort feels.

Every stake holder wants at any cost his pound of flesh in the booty of business efforts starting from the promoters, to the shareholders ,the financiers, the vendors, the employees, the customers, the competitors, the society , and the governments constantly weave the web of complexity in the management of business. At times it becomes difficult to assess/trace the founding ethos of businesses which today are sunk deep in to the rut of unethical ways of business conducts.

6. BUSINESS COMPLEXITY MATRIX:



Note: It is necessary to conduct a detailed & relevant business environmental analysis before approaching the above matrix type of evaluation for specific business complexity. ©This is basically to avoid assigning higher weight ages to issues which are situational and subject to the dynamics of issues of political & economical policy related aspects of both domestic & global happenings.

In the following diagram an attempt has been made to represent a complexity matrix based on **Three Points Scale** of severity & on **three major aspects** which influence business complexity both at domestic and international business .On a severity scale of 3 the matrix tends to explain the nature of business complexity on an interactive process of aspects of Business Economics, Technological

Changes, and Regulatory and Corporate Governance interventions. There could be many related/unrelated aspects such as political & economical policy frame works which also influence business complexity. However in order to avoid conflicts in understanding the matrix and resultant confusions the author has decided to consider only these three aspects within the scope of this paper. As one could see the matrix allows the readers to observe the important Nodal Points in the Matrix which help identifying crucial stages in the business at which the complexity dimensions can be measured and evaluated for steps for the reduction of business complexity, which pose as risks and threats for sustenance & growth.

7. SEVERITY RATING OF BUSINESS COMPLEXITY

Business Economics Related Complexity-(FINANCIAL COMPLEXITY) ‘**F**’

F1 – Highly Severe : Severe pressure on current Ratios of Business, Multi Creditors, Multi Debtors, Multi Types & sizes of Investments, Inventories, Non Performing Assets, Non value Adding assets & operations, complex Market forces, Complexity due to JVs, M&As, Complex Corporate Governance requirements.

F2 – Moderately severe Complexity

F3 – Manageable & Short term complexity

Technology Related Complexity- ‘**T**’

T 1- Highly severe technological complexity – Product , Process, Operational, Marketing Severity of competition on technical aspects of performance & quality (Highly Differentiated Terms of product acceptance, Technology obsolescence speed & nature.

T2 – Moderately Severe- Needing further Investments in R&D etc

T3 - Manageable Severity- Conditions on time scale manageable with some additional efforts.

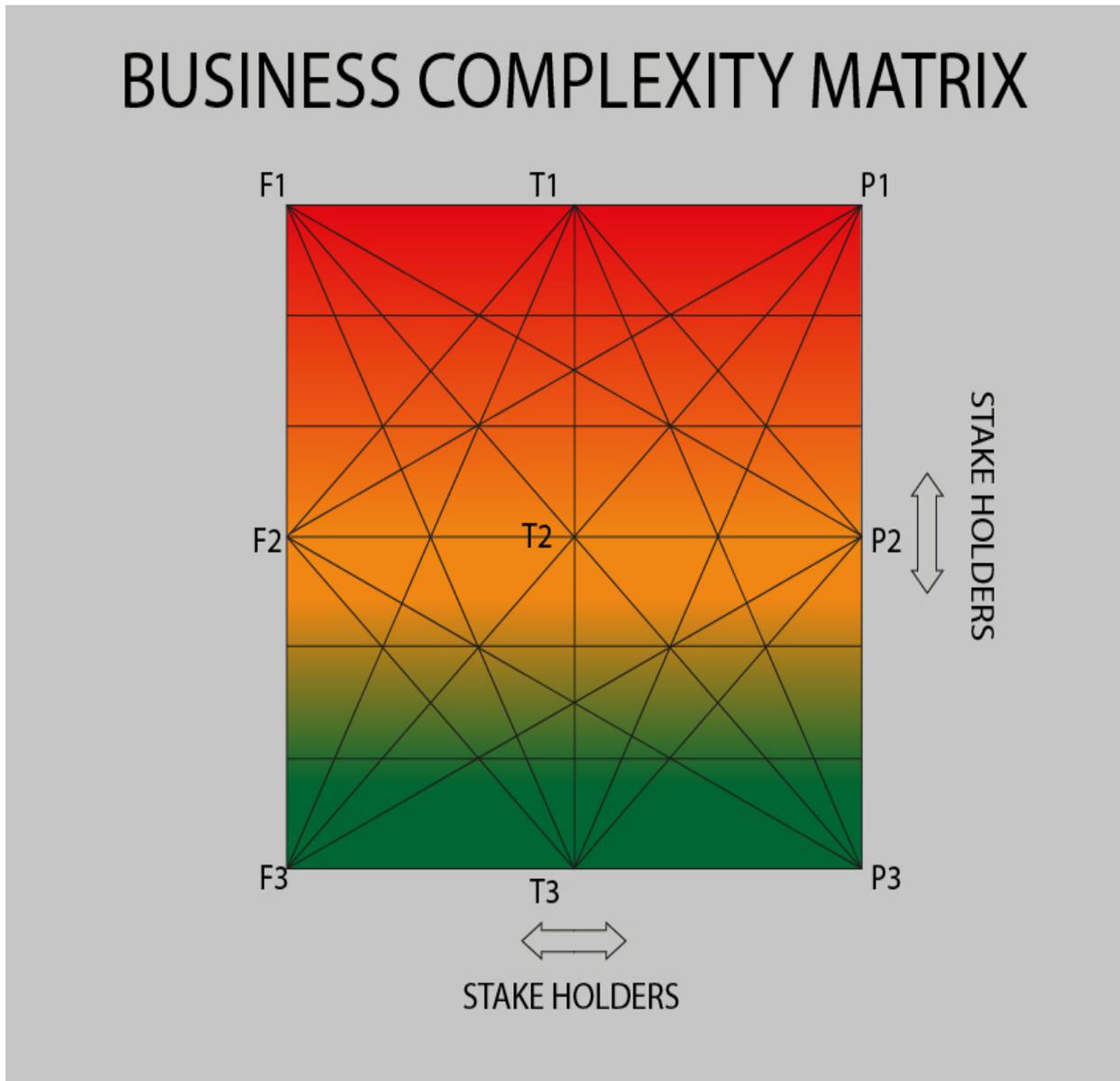
Regulatory/social/Corporate Governance Related Complexity- people & Business-process related—‘**P**’

P1-Extremely severe regulatory requirements arising out of Environmental Control obligations, Situations creating social uproar against business continuity /expansion, stricter Conditions due to Corporate Governance Norms and business regulations restricting Mergers & Acquisitions, Investments in Foreign Countries due to economical sanctions & regulations.

P2- Moderate Complexities of regulatory and similar restrictions which can be resolved by persuasions & plead.

P3- Time bound conditions & restrictions due to economic/social reasons

8. WEALTH (F)- HEALTH (P)- CAPABILITY(T)



Red: Severe complexity Orange: Moderate Complexity, Green: Normal Complexity

CONCLUSIONS

The above matrix can be used to conduct a Portfolio analysis of Products, Businesses, Critical Success Factors, & Business Drivers in a Competitive Global Business Scenario, to analyze and arrive at appropriate strategies to address business complexity issues.

Implementation and usage of Business Complexity Matrix as a tool for Strategy formulation & strategy Implementation will be of immense use to avoid businesses getting trapped in the web of Business complexity (Both Strategic & Operational Controls).

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CASE FOR TRAINING NEEDS IDENTIFICATION IN PUBLIC SECTOR IN NIGERIA

Adesoye Kayode .A. Msc
adesoyekayode@yahoo.com
,Department of Psychology
University of Ibadan, Nigeria.
08023700408
and
Akinyemi S.T Phd
Lagos State University,Ojo
Department of Educational Management

ABSTRACT

The public sector in Nigeria has suffered setbacks which are attributed to ineffective and inefficient training programmes. Effective training or development depends on knowing what is required for the individual, the department and organization as a whole to achieve their objectives.

Analyzing what the training needs are is vital prerequisite for any effective training programme or event. Simply throwing training at individuals may miss priority needs or even cover areas that are not essential. The popular approaches to training and development in Nigerian public sector have been mainly political and welfare. Employees are selected for training based on their geo political zones or to make them happy and not the organization. Despite the recognition of the importance of training by management experts and government as expressed in white papers on various reforms in Nigeria, the experience of manpower training and development in Nigeria public service has been of ruse and waste.

This paper examines the scenarios of Nigerian public services on manpower training and development with a view to understanding why various training programmes have not been yielding desired results. It makes appropriate recommendations on how to ameliorate the situation.

Key words: Training, needs, assessment, approaches, public ,sector and organization.

INTRODUCTION

Fajana (2006) defines training as the process that involves developing skills and learning concepts, rules or attitudes in order to increase effectiveness on a particular job. The significance of training obviously is to increase productivity. With the resultant changes attributable to information and communication technology (ICT), training is being conceived as a continuous exercise throughout and beyond working life. It is pertinent to establish a regular basis for the training needs of a job so as to determine best ways these needs can be addressed through training and development. According to Obisi (2001) training is a process through which the skills, talent and knowledge of an employee is enhanced and increased. He argues that training should take place only when the need and objectives for such training have been identified

Inyang (2009) opines that the public sector in Nigeria has suffered setbacks which are largely attributed to ineffective and inefficient management. Training need identification is a product of effective and efficient manpower management. The public sector in Nigeria has been bedeviled with wrong approaches to selecting employees for training. Despite the fact that there are various reports and suggestions for systematic approach to training what is evident in Nigeria public sector is that political and other subjective considerations over ride systematic approach to training which includes identification of needs for training.

OVERVIEW OF NIGERIAN PUBLIC SECTOR

The public sector refers to all organizations that exist as part of government machinery for implementing policy decisions and delivering services that of value to citizens. It is a mandatory institution under the Nigerian Constitution of 1999. The public sector is made up of the following: 1. The civil service which is often referred to as core service and is composed of line ministries and extra-ministerial agencies; and (2) the public bureaucracy, which is composed of enlarged public service., including the following: (a) services of the state and national assemblies; (b) the judiciary (c) the armed forces, the police and other security agencies, paramilitary services (immigration, customs, prisons , parastatals and agencies including social agencies, regulatory agencies, educational institutions, research institutes e.t.c

UNDERSTANDING TRAINING AND DEVELOPMENT

According to Obisi (1996) the concepts, of training and development are used interchangeably. However, it can be differentiated from the other. Training is for specific job purpose while development goes beyond specifics development covers not only those activities which improve job performance, but also those which bring about growth of personality. In training, you using one stone to kill one bird while in development you use one stone to kill two birds Mamoria, (1995).

Steinmetz, Lawrence (1996) notes that training is a short-term process, utilizing a systematic and organized procedure by which non-managerial personnel learn technical knowledge and skill for a definite purpose. Development on the other hand is a long term educational process utilizing a systematic and organized procedure by which managerial personnel learn conceptual and theoretical knowledge for general purpose.

Cambell, (1971) states that training refers only to instruction in technical and mechanical operations while development refers to philosophical and theoretical educational concept. Training is designed for non- managers while development involves managerial personnel. Training courses are typically designed for a short term, stated purpose, such as the operation of some piece (s) of machinery while development involves a broader education for long-term purpose. Training is for short-term while development is for long-term. Training is for specific job related purpose while development is for general purpose.

VITAL ISSUES IN TRAINING AND DEVELOPMENT

According to Armstrong (1995) the following issues are relevant to Training and development effectiveness.

- Strategic focus in Training
- Relevance of training
- Training process
- Identifying Training Needs and Training Needsanalysis
- Identifying Training Objectives
- Evaluation of Training

STRATEGIC FOCUS IN TRAINING

Training activities in an organization should be a continuous process and not a once and for all activity. It is an on going process for new, old, transferred and promoted employees. According to Armstrong (1995) training strategy takes a long- term view of what skills, knowledge and levels of competence employees of the organization need. Training should be an integral part of the management process which in turn require managers to review regularly with their teams and the individuals reporting to them, performance in relation to agreed objectives.

RELEVANCE OF TRAINING

Relevance of training is a very important issue that organizations should look critically at if they really want to improve the effectiveness of their employees. Any training program that is not relevant should not be undertaken. Training should be designed to solve problems and to fill gaps in employee performance. Training should make

things happen and bring about changes that would enhance organization's effectiveness. It is not proper for an organization to embark on any training program which is not relevant to it and its people.

Armstrong (1995) agrees that for any training program to be relevant, it must satisfy identified and appropriate needs.

PLANNED TRAINING

Planned training is the deliberate intervention aimed at achieving the learning necessary for improved job performance. Planned training consists of the following steps:

- Identify and define training needs
- Define the learning required in terms of what skills and knowledge have to be learnt and what attitudes need to be changed.
- Define the objectives of the training
- Plan training programs to meet the needs and objectives by using right combination for training techniques and locations.
- Decide who provides the training
- Evaluate training.
- Amend and extend training as necessary.

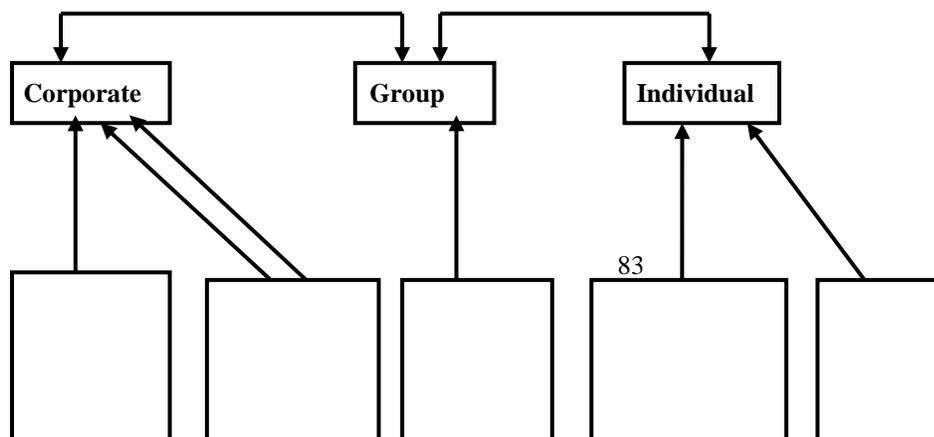
Obisi (2011) posits that the inability of organizations to identify training needs is one of the major tragedies in organizations training practice . Employee performance appraisal outcome should reveal strengths and weakness. The weakness revealed should form training needs. Whenever there is a gap or vacuum between what employee is doing and what he should do, there is a training need.

Armstrong (1995) presents a clearer understanding of what is meant by training needs. He writes that the gap between what people know and can do and what people should know and be able to do is called training need. Therefore when an organization observes that there is a gap between what is happening and what should happen, there is a training need.

ANALYSIS OF TRAINING NEED: There are four major ways of analyzing training needs.

- Analysis of jobs
- Performance appraisal
- Conducting training surveys • Business and human resource analysis

Armstrong (1995) gives a diagrammatical analysis of training needs. Training should be analyzed first for the organization as a whole-first for corporate needs, second, for department, teams, functions or occupations within the organization-group needs, and third, for individual employees-individual needs.



Analysis of Strategic Plan **Analysis of human resource Plans** **Training surveys** **Performance reviews** **Job analysis**

APPROACHES TO TRAINING

Administrative Approach: This approach perceives training as administering training records, completing industrial Training / Industrial Attachment and the likes. Other examples include organizing induction courses for newly employed officers.

Systematic Approach: This approach is a logical and sequential method of training. It is a more scientific approach to training. It follows the sequence of performance problem leading to the identification of training needs to designing of training objectives to implementing training and the last stage is evaluation of training.

Organizational Development Approach

It emphasizes the application of behavioural sciences for assisting organizations in identifying planning and implementing organizational changes.

Interventions are focused on organizational processes such as communication, information sharing, interpersonal relations, team building and the use of meetings. Organizational Development considers bringing about meaningful change in the entire organization through training and development. It is a scientific approach to training.

Political Approach: This approach considers training as a tool for fostering further influences, power and fame. Trainees are sent on training without really identifying their training needs but selected based on geo-political considerations. It is a non scientific approach.

Welfare Approach.

This approach considers the happiness or Welfare of the individual in selecting trainees for training rather than organizational happiness or group effectiveness. It is a non scientific approach to training.

Comparison of Training Models in both the Public and Private Sector in Nigeria.

S/N	Training Model	Public Sector	Private Sector
1.	Reinforcement Model of Pavlov-programmed learning	Used frequently based on Identified training Needs	Used more frequently for Needs specific training
2.	Information processing model-heavy use of computers, LAN WAN, MAN i.e, networking, telecommuting, Virtual organisation	Just picking up in the public sector. It is seldom used but is becoming popular now	Highly used in private sector organizations, companies like the oil Industry, Banks and Engineering outfits.
3.	Social learning theory/model Observation of work is done using mental models	Still in some use, not really used	Still in high use
4.	Transfer of learning – the newly trained enlightens or educates others.	Pick-up in the next one to two years	Highly used.

Adapted from the study pack of the chartered institute of personnel management in Nigeria.(CIPMN) STUDY PACK (2011)

The interpretation from above is that the private is still more purposeful in training than the public. The CIPMN has made efforts through Annual Conferences to renew government operations by providing training to government employees and encouraging government to let her employees use the knowledge to develop their ministries rather than transferring them to other agencies immediately after training.

PROBLEMS AND PROSPECTS OF TRAINING AND DEVELOPMENT IN NIGERIA

The importance and significance of training and development to organisational development has no doubt been recognized in the Nigerian public services. However, it is confronted with a number of problems. Some of the problems include the following:

- There is the absence of systematic training despite the various reforms that emphasise this since late 1960s. This problem needs to be addressed urgently if training must attain its objectives. By adopting the recommendations that were made by the various public service reforms in the country.
- Poor funding. This is reflected in the difference between budgetary provisions and actual funds released for various years both at the federal and state levels. Concerted efforts must be made by government to address the problems associated with funding training.
- Most of the training schools and centres established by government are poorly funded, which render them impotent to effectively perform their functions.

The state and federal governments adopted the recommendations of the 1988 and 1998 civil service reforms which stipulate that ten per cent (10%) of total annual personnel emoluments be set aside for staff training and development. Most states including the federal government have failed to honour this.

- Poor staffing for most of the training centres. The quality of the staff available in these training schools will to a large extent determine the quality of training given to the personnel that are sent there for training.
- Inadequate training facilities in these centres. Most of them do not have modern training facilities such as computers, laboratories, libraries, vehicles.
- The use of quack consultants by government has grossly affected the quality of training by public servants. In many instances, government prefers to contract training programmes to party loyalists rather than competent and experienced specialists in the higher institutions and consulting firms.
- High cost of training has been occasioned by lack of honesty and transparency..
- Curricula and methods remain insufficiently attuned to job contents due to several factors such as funding, size of the trainees etc.
- Poor utilisation of trained workers. Many public servants sent for training are not allowed to utilise their skills and knowledge because of bureaucratic rigidity and unwillingness to change.
- Lack of proper consideration for training needs. Many times, public servants are sent for training without consideration for the relevance to present job or future posting.
- Lack of coordination among the various training institutions in the country.

RECOMMENDATIONS.

- (a) The adoption and implementation of systematic approach to training and development in the public sector.
- (b) The various training regulatory agencies set up or approved by the government should ensure that standard is maintained in various institutions that conduct training.
- (c) Government at all levels should ensure that recommendations of various committee set up by government on how to improve training and development are implemented.
- (d) Commitment and will to fund training adequately by government and carry out evaluative studies will go a long way, in improving training and development in Nigeria.

- (e) Will to utilize research results through training will create a new mind –set for Nigerians to develop through training and development.
- (f) Reduction in tariff and duties paid on imported training equipment.
- (g) Partnering with some embassies on the training needs of Nigeria
- (h) Responding positively to the globalization call.
- (i) Government at all levels should regularly conduct skills assessment on their employees
- (j) Gather information through observation, questionnaires, interview, appraisal systems.
- (k) Analyse the established data.
- (l) Calibrate the available skills against the required job.
- (m) Help and support employees to take more responsibility for how they do their jobs by coaching and mentoring.

CONCLUSION

Personnel in any organisation remain the most invaluable asset for growth and development. Training and re-training are essential components of manpower development. Manpower development and training play a major, if not decisive, role in promoting economic growth with equity; they benefit individuals, enterprises, and the economy and society at large; and they can make labour markets function better. Ideal manpower training and development will no doubt produce economic, social and political growth. It is unfortunate; however, that most training programmes that have been embarked upon at the various levels of government in Nigeria have not produced the desired results mainly due to attitudinal problems on the part of government and the trainees. The challenge before us is to introduce new orientations on training that will address training contents; training evaluation; attitudes to training and training utilization. These should be geared towards economic and social growth in the country.

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Computer Aided Design Validation of the Quality Function Deployment for Seat Comfort Prediction

Saed Amer
samer01@my.tnstate.edu
Department of Mechanical and Manufacturing Engineering
College of Engineering and Technology
Tennessee State University
1500 John Merritt Blvd. Nashville, Tennessee. 37209

Dr. Landon Onyebueke
lonyebueke@tnstate.edu

ABSTRACT

Seat discomfort is a major cause for occupant's health complications and is blamed for the diminished quality of the seated activity. Although many studies were conducted in the area of seat comfort, it seems that the ability of the seat to provide comfort is still deficient; this can be noted through the countless products that claim to provide or improve seat comfort. Seat comfort evaluation is currently performed through tedious procedures that consume resources using physical prototyping and human testing. This study pertains to a technique that expedites seat comfort analyses by integrating three systems each can be an adequate tool for seat comfort evaluation. The first system is used to retrieve information from the customer via Quality Function Deployment (QFD) and examine the current seat design against the existing products and market leverage. The second system is a Computer Aided Design (CAD) technique that allows the designer to model and evaluate seat comfort in the early design stages. Finally, a prediction model is used to integrate the two systems by fusing the subjective analyses obtained from the QFD with the objective analyses from the CAD technique. This study aims to present a validation technique that guarantees the subjective analysis in the QFD including the relationships between the customer's needs and the designer's solutions. The proposed technique employs CAD to test the degree of relationship depicted for the seat components comfort level as each seat parameter undergoes a controlled change. The outcomes of the system are compared before and after the validation process to prove that the QFD validation using CAD post the accuracy and increase the correlation when compared to traditional seat comfort techniques.

KEYWORDS

Seat Comfort, Quality Function Deployment, QFD, Computer Aided Design, CAD, Computer Aided Engineering, CAE, Finite Element Analysis, FEA.

INTRODUCTION

Seat comfort is defined as a system that provides adequate body posture and support without excess physiological pressure points while maintaining overall occupant well-being [1]. Implied from the definition, many factors are considered to increase the comfort privilege; some can be subjective i.e. driven by the occupants' psychological preferences and mood. Such factors are indefinite and may be impossible to measure. The outmost factors are the objective ones which can be measured and controlled. Some of the objective factors include physical factors that influence seat comfort such as Biomechanics and Physiological factors [2], vibration evaluation [3], thermal and humidity factors [4]. The most considered factor for comfort research is the investigations of contact pressure distribution between the human and the seat. According to literature surveys and laboratory experimentations, the correlation between objective and subjective data suggests that decreasing the contact pressure between the human and the seat brings about more comfort [5]. Contact pressure measurement is usually obtained using pressure mapping systems such as TekScan BPMS. An example of such implementation is the work performed by *Ojetola et al.* The study employed the pressure mapping to evaluate the seat comfort for ejection seats with regards to three different rail angles [6].

Seat comfort evaluations are traditionally performed on finished products and may require human testing. The main shortcoming of such procedures is the resource consumption due to the need for finished products; in which

case, alterations are usually retrofitted into the seat and has to be mended in a new seat production cycle [1]. According to *Kolich et al.*, seat developing cycle may take up to three years as illustrated in Figure 1 [7]. Another shortcoming is the dependence on human feedback which is costly and indefinite due to the lack of consistency. Therefore, there is a need to improve seat comfort design by developing an innovative technique that reduces resource exploitation and utilizes concrete tools to control and enhance seat comfort.

The advancement of CAD in the industry enhances the continuous design with better product competitiveness and improves quality by reducing resource consumptions. CAD also promotes information sharing which expedites the design process. Researchers recognized these benefits and put CAD to work for seat comfort analyses. For example, *Mamat et al* focused on the integration of CAD system and human factors in the design of new seat products that relates to comfort based on the ergonomics view and ease of assembly [8]. *Tang et al.* accomplished another study on using finite element analysis approach to detect the areas of high contact pressures between seat cushion and human buttock-thigh tissue [9].

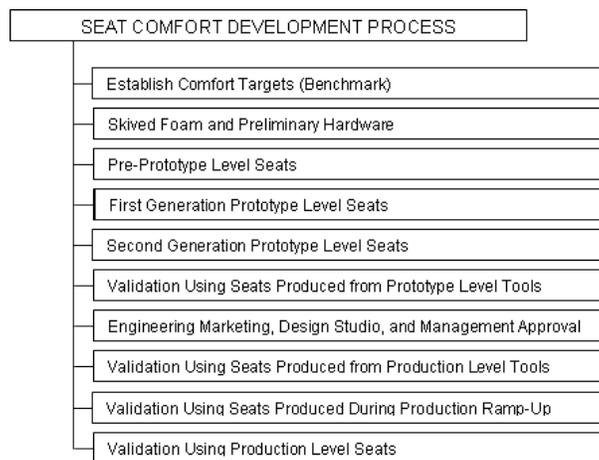


Figure 1. Flow chat for typical seat development process [7].

The main study introduces a system of a Quality Function Deployment (QFD) tool integrated with Computer Aided Design (CAD) technique to perform seat design and interactively analyzes its level of comfort. Though very useful, QFD can be conceptual and indistinct. In this study the indefinite aspects of QFD are validated using measurable entities using CAD analyses. The comfort evaluation process will be based on the Finite Element Analysis (FEA) of the contact pressure between correctly dimensioned CAD models of humans and seats with proper material properties. The proposed technique aims to develop seat comfort QFD to indulge the customers' needs and translate them into design parameters. The study also aims to create a CAD tool validated in the laboratory to replace the conventional seat comfort measuring tools.

QUALITY FUNCTION DEPLOYMENT (QFD)

Seat comfort definition suggests that the occupant (customer) is where the designers should search for answers. The proposed system considers nearly everything but the psychological factors that relate to comfort. The main factors considered for comfort measurement include ergonomics, anthropometric, physical, biomechanics and the performance aspects of the occupant. Therefore, these aspects are the ones considered when retrieving information from the end-user. This approach is approved as a System Engineering technique where the requirements, parameters, synthesis and validation are documented and effectively carried out [10]. QFD opens the venue for better design practice thru interacting with the customer and translate the customer's needs into design parameters [11]. As illustrated in Figure 2, QFD consists of different matrices that examine different relationships to link the customer inputs to the product design. The construction and population of the QFD for seat comfort analyses was based on prolonged and comprehensive investigations of the parameters that relate to seat comfort. The investigations examined the degree of influences each parameter imposes on the comfort level. The process of evaluating the seat comfort using QFD begins by obtaining the customer's requirements for comfortable seats and

are then assessed based on the previous investigations to decide if they would have any considerable impact on the design. These requirements are usually referred to as the WHATs. The WHATs are usually collected using customer surveys, product reviews, direct interviews and more. The designers then set up the parameters that are needed to achieve the customer's requirements. These parameters are denoted in the QFD as the HOWs. More matrices are populated to examine the relationships between the customer's need and the design parameters. Other matrices test these parameters with current products, market analyses and the manufacturing process. By combining these matrices a numeric value for the comfort level of the new and the current seat products are obtained.

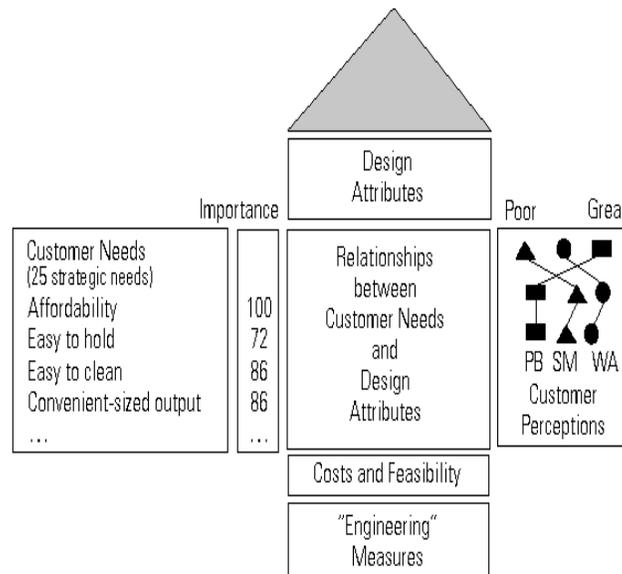


Figure 2. House of Quality Rooms and Relationships [12]

PRELIMINARY CONCEPT DEVELOPMENT AND THE RELATIONSHIP MATRIX

Preliminary Concept Development depends mainly on the designer expertise; nevertheless, literature survey, background research, and hands-on experimentations are important to perform this step. Usually, this step is performed via a relationship matrix that illustrates the importance of the suggested design parameter to the customer's needs. The conceptual design development planned must include all the HOWs and justify which of the HOW satisfies the WHAT using the relationship matrix which ranks the relation with values of 9, 3 or 1 assigned for strong, moderate or weak relationship respectively [13]. Figure 3 illustrates such relationship for a WHAT, the seat width, for example.

The WHAT	The HOWs	
Seat Width	Seat Cushion	9
	Seat Frame	9
	Backrest	3
	Armrest	3
	Lumbar Support	3
	Others	3

Figure 3. Seat Width Relationship with HOWs List

The importance of the relationship matrix is obvious for optimizing the design process [13]; In the case of seat comfort, it has been established from the literature survey that the design parameters in the HOWs' list contain mostly the factors that affect the level of comfort on each customer requirement [11]. Furthermore, this stage carries high level of importance because it draws the map that leads the designer to the expedited way to achieve optimum design solutions that significantly help satisfy the customer requirements [11, 14]. As the designer

reaches this stage, the goals are set and the optimum paths to the solutions are clear which reveals the importance of the customer voice to seat comfort analysis.

COMFORT EVALUATION USING QFD

Seat comfort evaluation via QFD is carried out using the customer as the ultimate by comparing its features and parameters to the ones of the recommended seats. In other words, the seat evaluation process will be performed by associating it to a target. Based on the customer's inputs and through the existing competitors comparisons, the first stage of QFD provides the designer with the adequate product parameters and degrees of importance each parameter contributes to the design. The values of the importance are given by a percentage that suggests higher percentage to more importance. The second stage of the QFD is implemented to obtain the parts' parameters which provide the designer with more precise seat attributes and measurements that promote seat comfort. As in the first stage, the percentage of importance for each part parameter is calculated. The final output of the QFD includes the percentage of importance of the products parameters and the parts parameters that constitute comfort. Consequently, the final value for the comfort level is derived from combining the values of importance to produce a final ranked from zero (0.0) to five (5.0) that represent the comfort level of the proposed seat.

COMPUTER AIDED DESIGN FOR SEAT COMFORT EVALUATION

CAD is defined as the exploitation of computer systems to expedite the creation, modification, analysis, or optimization of a design [15]. It was noted in previous works and literature surveys that Computer Aided Design/Engineering is an adequate tool for seat design and comfort analysis [16]. The advent of CAD permits the evaluation of seat comfort in the early design stages circumventing physical prototyping which is utterly pricey and tedious. The proposed CAD technique performs comfort evaluation by simulating sitting postures on a new seat model and determines the physical factors that contribute to its comfort; CAE is employed to analyze the physics that relate to seat comfort and evaluate the comfort level of projected seat designs using different simulated seating scenarios. The Computer Aided Design system is launched with an interaction channel that ties the QFD and the CAD systems. At this juncture, the output of the QFD technique are the design parameters, known in QFD as the HOWs, which by far satisfy the needs of the customers. These parameters and entities are then conveyed to the CAD technique as the blueprints for the modeling new seat designs.

SEAT FEATURES

Laboratory experimentations and literature surveys agree that adding seat features provide more contact area between the seat and the occupant which seems to promote comfort [8]; hence, it is important to consider the effects of the seat features on the comfort evaluation process. In this study, seat features can be retrofitted to the seat design or removed without losing the functions of the seat. Different seat features were considered in this study and were created and enclosed in an easy to access CAD database. Some features may require alteration of the basic seat's parts such as lumbar support and cushion curvature, while most can be added to the seat as separate parts such as the head rest, armrests, and the footrest. The seat adjustment features are also considered in this technique for accommodating different individuals with different anthropometries; such features include seat-pan height, rotation adjustments, back support angle adjustment and more.

THE SIMULATION TECHNIQUE

For the purpose of this study, sitting posture is described as the manner that the human body is positioned on the seat surface and the manner that the human body is supported to fit and feel in the seat [17]. Several sitting postures were considered in this study aiming to understand the importance of seat features to comfort. Figure 4 shows seven sitting postures used in laboratory experimentation and are simulated using the CAD software. The first posture is considered the simplest where all the analyses are centered in the cushion and the rest of the seat features are neglected. This posture describes the human sitting up on the cushion, arms positioned on the thighs and head held up. Gradually, more seat features are added and more of the body surface areas are in contact with the seat surface, hence, the load will be distributed on more surface areas consequently, reducing the contact pressure.

FINITE ELEMENT ANALYSIS (FEA)

Finite Element Analysis (FEA) can be described as a technique that demonstrates the reaction of an object in CAD due to excitations; this may include force loadings, contact pressure, thermal excitations, fluid motions and more [18]. As established in the definition for seat comfort, the physical measurement of seat comfort depends on the regions of high contact pressure between the occupant and the seat surface; these regions are usually discovered using tools that identify the contact pressure points and map them with respect to the sitting posture.

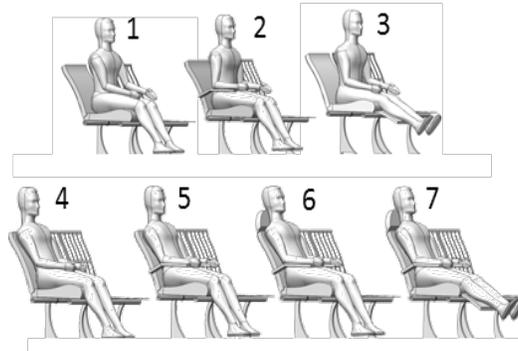


Figure 4. Seven sitting postures were implemented to test the effects of having different seat features on the seat comfort. 1) Up position (UP), 2) UP with armrests, 3) UP with footrests, 4) Back Position (BP), 5) BP with armrests, 6) BP with armrests and headrests, 7) BP with armrests, headrests and footrests

One of the conventional tools used to detect contact pressure is the Pressure Mapping Systems. In the CAD technique, however, contact pressure regions are detected using (FEA). Research shows that FEA is a valid technique which is highly considered in the industry [16], yet many calibrations and validation testing were performed before endorsing it. The more high pressure regions discovered, the less the comfort level of the seat. FEA outcomes are presented in a three dimensional map that gives that researcher better sense of the position and magnitude of the high contact pressure regions. Figure 5 shows the FEA results mapped on the original model making it easy to find the location of the high contact pressure in relation to the touching surfaces.

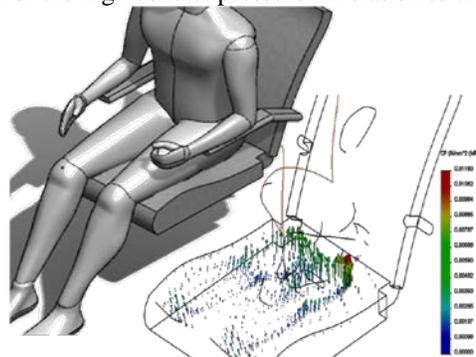


Figure 5. Contact Pressure in Finite Element

CAD VALIDATION

Laboratory experimentations were carried out in order to validate the results obtained from the CAD based evaluation study. The preliminary experiments were geared toward calibrating the needed tools including the weight measuring devices and the pressure mapping system. Few of the experimentations were performed to examine the distribution of human weight loadings on the seat. However, the foremost validation experimentation was performed using Tekscan pressure mapping system to explore the regions of high contact pressure for a human subject sitting with the acknowledged postures (Figures 6 and 7). The experimentations were carried out to validate the proposed technique by examining the contact pressure observed through the traditional seat comfort evaluation technique and compare them to the ones of the CAD based technique. The sitting scenarios are then simulated in CAD and similarities and differences of the outcomes are investigated. The loading distribution analyses are important in this study to be simulated properly in the Finite Element Analysis technique which

examines the regions of pressure points between the seat and the occupant. Therefore, several experiments were performed to examine the distribution of the human load on the seat with different postures and seat parameters.



Figure 6. CAD Validation by Conventional Methods

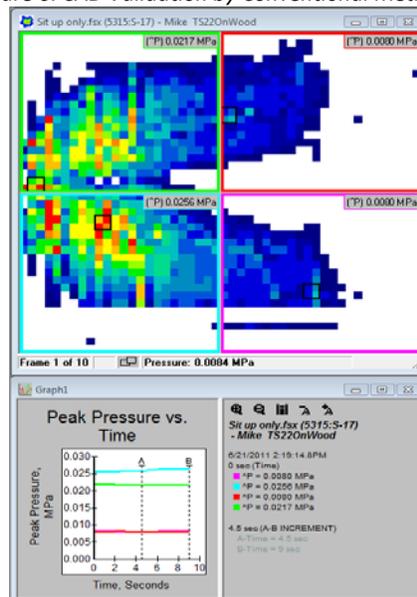


Figure 7. Tekscan PBMS delivers the contact pressure of a sitting person on top of a seat cushion. The results are represented as a map of high and low pressure region.

THE QUALITY FUNCTION DEPLOYMENT VALIDATION

The validation of the QFD technique is performed by two different techniques. The first technique is carried out by studying the QFD outcomes for a product evaluated with traditional evaluation technique then compare it to the QFD observed with the customer's feedback. This can be obtained by constructing a matrix in the House of Quality that test the relationship among different products. The second and eminent technique for QFD validation is performed using the Computer Aided Design technique; this is obtained by implementing the QFD design parameters in the CAD software then testing the relationships among the design parameters (HOWs) and the consumer's requirements (WHATs). The QFD validation using CAD is done by taking each seat parameter individually then observing its comfort response when exposed to small incremented changes. For example, in the QFD relationship matrix, armrest comfort (WHAT) may show strong relationship with armrest height (HOW). CAD can validate that by watching the armrest contact pressure when the armrest height is changes to 23in, 24in then 25in. The observed contact pressure values are then interpreted into comfort values using a mathematical model that relate the increasing of the pressure to the decreasing of the comfort. The degree of deviation of the comfort values observed via CAD determines whether the relationship is strong, moderate or weak. CAD validation is performed in every QFD to determine the degree of agreement among seat parameters. The Results obtained from the QFD technique are presented in one of the compartments of the QFD chart; the outcomes shows improvement of the comfort level of the new product compared with different products and is compared to a set up target. Finally, the validation process provides new comfort value to be conveyed back to the first stage of the QFD to replace the comfort value obtained from the customer's appraisal against existing products.

RESULTS AND DISCUSSIONS

Endeavoring to replace the traditional seat comfort evaluation with a more economical and time effective technique, the CAD technique is proposed to overcome the shortcomings of such tedious procedures. The results manifest the system’s ability to detect the effects of the seat factors that promote the comfort level of the seat design. In order to obtain proper understanding of the importance of the proposed technique, seat features and seat cushion materials were manipulated and tested for comfort; these features include backrest angle, armrests, headrests, and footrests. The cushion materials considered in this study were hardwood, memory foam, gel cushion and air-filled cushions. Figure 8 shows the outcome of the CAD validation.

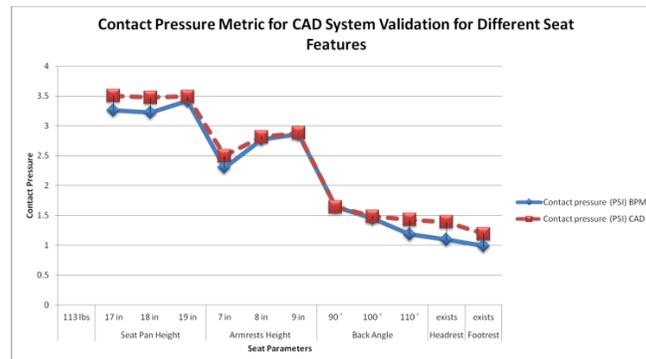


Figure 8. Seat Features Validation Graphs

Parameters	Value	Armrest Comfort		
		Max Contact Pressure	STDV	QFD Relation
Armrest height	23.00	4.50000		4.1
	24.00	2.34000	1.32	9
	25.00	2.10000		4.6
Armrest length	7.00	2.84000		4.5
	8.00	2.30000	0.31	3
	9.00	2.29000		4.6
Armrest thickness	2.00	2.65000		4.5
	3.00	2.30000	0.30	3
	4.00	2.06000		4.7

Figure 9. CAD Validation Outcomes

The new CAD observations consist of new relationship assessments, optimum seat parameters and the optimum comfort levels (Figure 9). These values are then updated in the QFD with the proper comfort level observed from the CAD then the new QFD is inserted back in the cycle. Figure 10 shows the process of updating the QFD from the CAD data. The outcomes of the system were compared before and after the QFD validation. As depicted in Figure 11, the error observed from the system without QFD validation averages 13% while it was recorded with an average of 6% error after CAD validation.

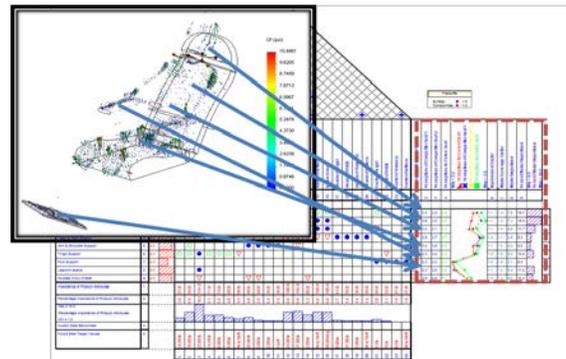


Figure 10. The updated QFD values are inserted into the system

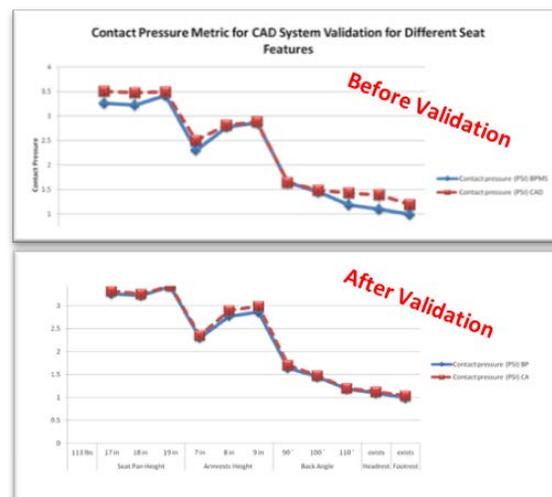


Figure 11. Correlation comparison for the outcomes before and after the validation process

CONCLUSIONS

The proposed system aims to reduce the dependence on the tedious and expensive traditional techniques for seat comfort design and evaluation. The system consists of three major subsystems that retrieve and analyzes the feedback from the customer via QFD, then performs proper comfort investigation using CAD; finally, the data are fused in a mathematical prediction model and provides a value that represent the comfort level for the tested product. The QFD phase is very important because it draws the optimum path for the new product design; yet it is build based on many subjective measures which can cause deviation and lack of consistency. In order to overcome such shortcoming, the system performs a validation process for the QFD using CAD. The CAD validation process examine every relationship between the WHATs and HOWs by monitoring the comfort level for a particular seat parameter when experience slight changes. The outcomes show that the error observed after the validation process was reduced by 7% boosting accuracy and promote the system ability to decrease resources consumption and endorse efficiency.

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Contribution of ICT for Stimulating Cyber Entrepreneurship: A Model of Financial Inclusion

Dr. Broto Rauth Bhardwaj

Head, Research and Development
Bharati Vidyapeeth University,
Institute of Management and Research, New Delhi, India

Supreet Juneja

Bharati Vidyapeeth University,
Institute of Management and Research, New Delhi, India

A.R. Deshmukh,

Librarian, Bharati Vidyapeeth University,
Institute of Management and Research, New Delhi, India

ABSTRACT

This research analyses the role of ICT in enhancing cyber entrepreneurship is discussed. Critical success factors (CSFs) that influence the adoption of cyber entrepreneurship are discussed. The managerial and research implications are also discussed.

Design/Methodology: The study is based on literature review and case study method (Eisenhardt, 2003). The data was collected on the basis of random sampling. We have analyzed the variables influencing the adoption ICT for cyber entrepreneurship and developed a validated model for organizations.

Managerial/research Implications: The study has several policy and managerial implications. The study contributes towards the existing literature on economic inclusion in building theories on economic inclusion. The study identified the role of education policy, clear objectives and long term technological plans, measuring and control, and evaluation criteria in cyber education as some of the critical success factors of implementing ICT strategies.

Originality/value: The research offers methods to develop strategic capabilities such as policy, technology and human resource development to enhance the adoption of ICT practices which is an increasingly topical issue amongst academics, students, and managers.

Key words: ICT, internal environment, sustainable strategies, education, cyber entrepreneurship

Introduction:

E-business is described as Internet-facilitated integration of business processes, applications, and information systems (Tiwana and McLean, 2001). Entrepreneurship is a process integrating opportunity, resources and people the entrepreneurs (Timmons & Spinelli, 2009). Gartner (1988) states that the entrepreneurs are individuals with have a specific set of personality explain a person as an entrepreneur. Personality traits have proven to be predictors of many aspects of entrepreneurship including the intention to start a business, succeed in running a business, and enhance corporate entrepreneurship (Shaver and Scott, 1991).

Internet entrepreneur -An internet entrepreneur is defined as an individual who develops a business based on the internet connectivity model (i.e. IP based protocol) and strategically manages new business models and technologies by implementing product, service, process and/or knowledge innovation for fast growth outcomes (see Wong, 2008; Millman et al., 2009). Dotcoms are generally created by Internet-based entrepreneurs, also called **cyberentrepreneurs**. According to Bret & Champeaux (2000) a cyber entrepreneur creates a firm that is essentially founded upon electronic commerce, and whose main activities are based on the exploiting networks using Internet, intranets and extranets.

Entrepreneurial motivation, drivers and intentions -One of the major themes in the specialist literature on entrepreneurship refers to entrepreneurial motivation and intentions (see, for example, Masurel et al., 2002; Baum

and Locke, 2004; Manev et al., 2005). Early research on entrepreneurial motivation has identified a number of impacting factors, including: a positive attitude towards starting a business (Shapiro, 1975); a willingness to risk in order to gain (Krueger, 1993); a need for independence (Scheinberg and MacMillan, 1988), control (Ahmed, 1985) and autonomy (Roynalds and Miller, 1988); a need to improve social status (Cromie, 1987) and a drive to innovate and create new products or services (Shane et al., 1991).

There is a need to identify the full range of factors that impact upon student intentions to start an internet Business **Millman, C., Li, Z., Matlay, H., Wong, W., (2010)**. There are limited factors that have been explored in this paper so future research may include additional variables to access the impact of entrepreneurial intention towards cyber entrepreneurship to explain individual's behavioral intention to start up e-business. Those additional independent variables are attitude towards other factors, barriers, demographic variables and others, as we found those variables could affect individual intention towards cyber entrepreneur. **Badaruddin, Mohd Nizam .B.A., Arokiasamy,L.,, Nordin ,N. Mohammad., Yusof ,H.,, Zakaria ,T.,(2012)**

Literature review

Authors have also identified the need to understand relationship between infrastructure and education which could be pivotal for future public and academic policy efforts. Focusing on identifying specific collaboration strategies among regions or countries that lead to the growth of entrepreneurial ventures and economic development would be another critical contribution to the field (**Arthur ,S. J., Hisrich ,R.D, Cabrera ,A.,(2012)**).

There has been a massive growth in Indian Education Industry since the introduction of Computers as an Aid for Education. In country like ours where providing basic education to all is a big challenge, using Computer and Information Communication Technology ICT based techniques shows a promising future. Even Government of India has been trying to promote the use of ICT for education not only at the basic level but also at higher level for better and specialized researches and knowledge distribution. With a large pool of technologically educated population, Government has been trying to implement ICT for better education through various five year plans starting from the school level. With the benefit of lower labour and infrastructure cost, India has the ability to implement ICT at all levels of Education and later produce a technologically educated manpower. As the growth and education starts at the school level, its better we educate and implement greener management practices which students of today and professionals of tomorrow can carry on with them and make the world a healthier place to live. The primary objectives of the research are to find ways to implement greener management practices in Indian Education System. The contribution through this research is to develop methods to use ICT for better education system and better, greener environment.

A lot of study and research has been done to take care of such emerging technology related issues which are directly or indirectly affecting the environment around us. A lot of organizations across different countries across the globe have already started working towards a greener environment by various Green Management Practices but no such substantial work has been done in case of Education Industry.

With the increase in use of computer and other technology based gadgets in our day to day lives, the need to tackle with the issues arising from them has become a big challenge in front of us. Reports and researches show that technology users all around the globe have already acknowledged the upcoming issues and organizations and companies have started taking steps to take care of this upcoming environmental challenge. This research paper focuses on developing ways to understand and tackle the issues arising from ICT and technology based product and discover ways to practice Green Management practices in Education sector too.

Discussion

With the growing demand of computers, laptops, printers, CDs, DVDs, mobile phones, etc. for providing better education, threat to environment is increasing too. As it is important to understand the ill-effects of such technologies on the environment, role of education and its impact on the students, faculties and the entire society can not be ignored. This paper plans to discuss at length and derive some techniques to provide best ICT based education with emphasis on green practices within the campus and later around the globe.

Till now a lot of work has been done in the field of developing and practicing "Green management techniques" by industries and organizations in different areas but still no substantial step has been taken to understand its role and

impact on environment in the field of education. This project proposes to find such ways to initiate some methods which can provide valuable inputs to the educated generations to come.

Applying Moore's Law which is now considered as a guideline for the IT industry, it can be easily predicted that e-waste in India will rise by 500% by the year 2020 (UNEP report feb,2010). Such alarming facts forces us to think about environment by every means. Hence, contribution by the education industry is equally important as we, as education providers play an important role in shaping our future generations.

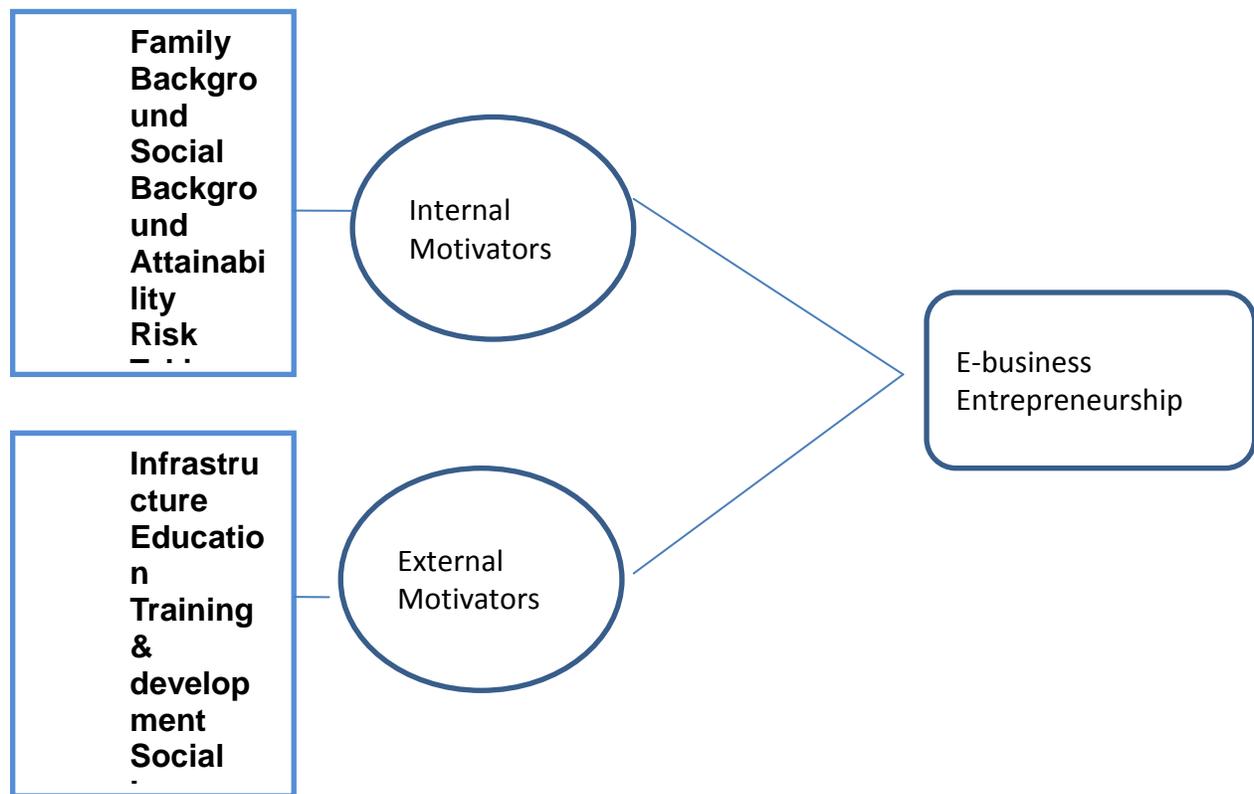
Research Implications

Considering the growing need for 'eco-friendly' practices in all walks of life, we can consider factors like possible threats by IT products, possibilities to make them less harmful and finally creating eco-friendly and greener ICT methods of education. Our research is based on finding techniques and ways which can enhance our affectivity as a facilitator by maximum use of technology, minimizing duplication of work and wastage of paper.

Managerial implications

After extensive study, we can consider that as 'green-marketing' has become the most sought after formula to promote any product and apply managerial skills, if concepts like 'green-education' can be introduced, it will not only help us create awareness and follow better education techniques with the help of ICT but we will be able to produce a healthier and environmentally aware citizens for a better tomorrow. Such projects will be highly beneficial from the point of view of Research too as it will help us help introduce such elements like paperless classrooms and recyclable state-of-art educational facilities.

Conceptual Model



With the introduction of healthy and green practices, apart from teaching implementation of “Green-Marketing” techniques to our students, faculties and later society, the research strives to help make the world a greener and environmentally healthier place for the generations to come.

As schools, colleges, universities and institutes play an important role in shaping and grooming the future generations, it becomes an important task to understand the need of following “Green Practices” while we use extensively use ICT for education purposes. The stress is more on using ICT for such practices is because on one hand, use of ICT makes work easier for the faculties, teachers and administrators it (ICT) on the other hand, harms the environment around us due to misuse of electricity, improper disposal of CDs & DVDs, Monitors, which are difficult to recycle or wastage of paper, etc which adds to our woes to save our environment.

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Embedded Pythagorean Ordered Triples Among Hyperbolic Functions

—
Jonathan D. Toms & Albert Y. Chi

Abstract. The Pythagorean ordered triples exist among hyperbolic functions and some of hyperbolic identities can be embedded in a well-organized format. Three levels of Chi-Toms graphs as well as further remarks and observations are also presented.

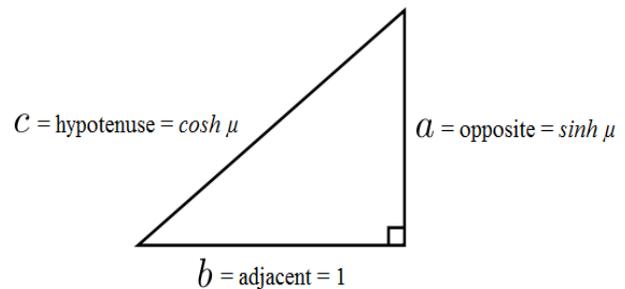


Figure 1: Right Triangle

1. INTRODUCTION. The Pythagorean ordered triple, (a,b,c) , do exist such that $a^2 + b^2 = c^2$, where a =opposite= $\sinh \mu$, b =adjacent= 1 , c =hypotenuse= $\cosh \mu$, which can be demonstrated from the accompanying figure 1

In other words, we have an ordered triple, $(\sinh \mu, 1, \cosh \mu)$ with the property

$$1 + \sinh^2 \mu = \cosh^2 \mu \dots \text{equation (1),}$$

$$1 + \operatorname{csch}^2 \mu = \operatorname{coth}^2 \mu \dots \text{equation (2),}$$

$$\tanh^2 \mu + \operatorname{sech}^2 \mu = 1 \dots \text{equation (3),}$$

where

$$\begin{aligned} \sinh \mu &= \frac{e^\mu + e^{-\mu}}{2}, & \operatorname{coth} \mu &= \frac{e^\mu + e^{-\mu}}{e^\mu - e^{-\mu}} \\ \cosh \mu &= \frac{e^\mu - e^{-\mu}}{2}, & \operatorname{sech} \mu &= \frac{2}{e^\mu + e^{-\mu}} \\ \tanh \mu &= \frac{e^\mu - e^{-\mu}}{e^\mu + e^{-\mu}}, & \operatorname{csch} \mu &= \frac{2}{e^\mu - e^{-\mu}} \end{aligned}$$

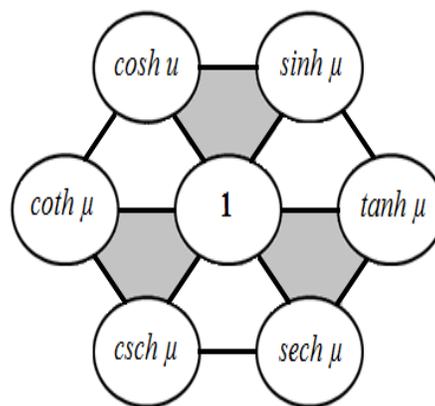


Figure 2: level_1 Chi-Toms Graph of Hyperbolic Function

The previous equations (1), (2) and (3) can be embedded in level_1 Chi-Toms Graph of hyperbolic functions (figure 2), such that

(a) with respect to the shaded regions of upside down triples, the sum of squares of items in the right and bottom corner nodes will be equaled to the squared of the item in the upper left corner node.

(b) with respect to any three adjacent nodes, around the arc of hexagonal graph the product of the values at two end nodes is equaled to the value in the middle node.

Sample case_1: For the connected triple nodes “ $(\coth \mu) - (\operatorname{csch} \mu) - (\operatorname{sech} \mu)$ ”, the product of the values from two end nodes is $(\coth \mu) * (\operatorname{sech} \mu) = \operatorname{csch} \mu$, which is the value in the middle node.

2. MULTI-LAYERS HEXAGONAL GRAPHS. The level-2 Chi-Toms graph of hyperbolic functions (figure 3) can be demonstrated by introducing three lines l_1, l_2 and l_3 with slopes of 1, -1 and 0 respectively. Starting with the node of the value 1 at the center, moving one level upper ward, and then we have multipliers $\sinh \mu$ and $\cosh \mu$ along l_1 and l_2 respectively. Similarly, moving one level downwards, we have multipliers $\sinh^{-1} \mu, \cosh^{-1} \mu$ along l_1 and l_2 respectively. By the same token, by moving on unit along l_3 to the right and left directions we have multipliers $\tanh \mu, \tanh^{-1} \mu$ respectively.

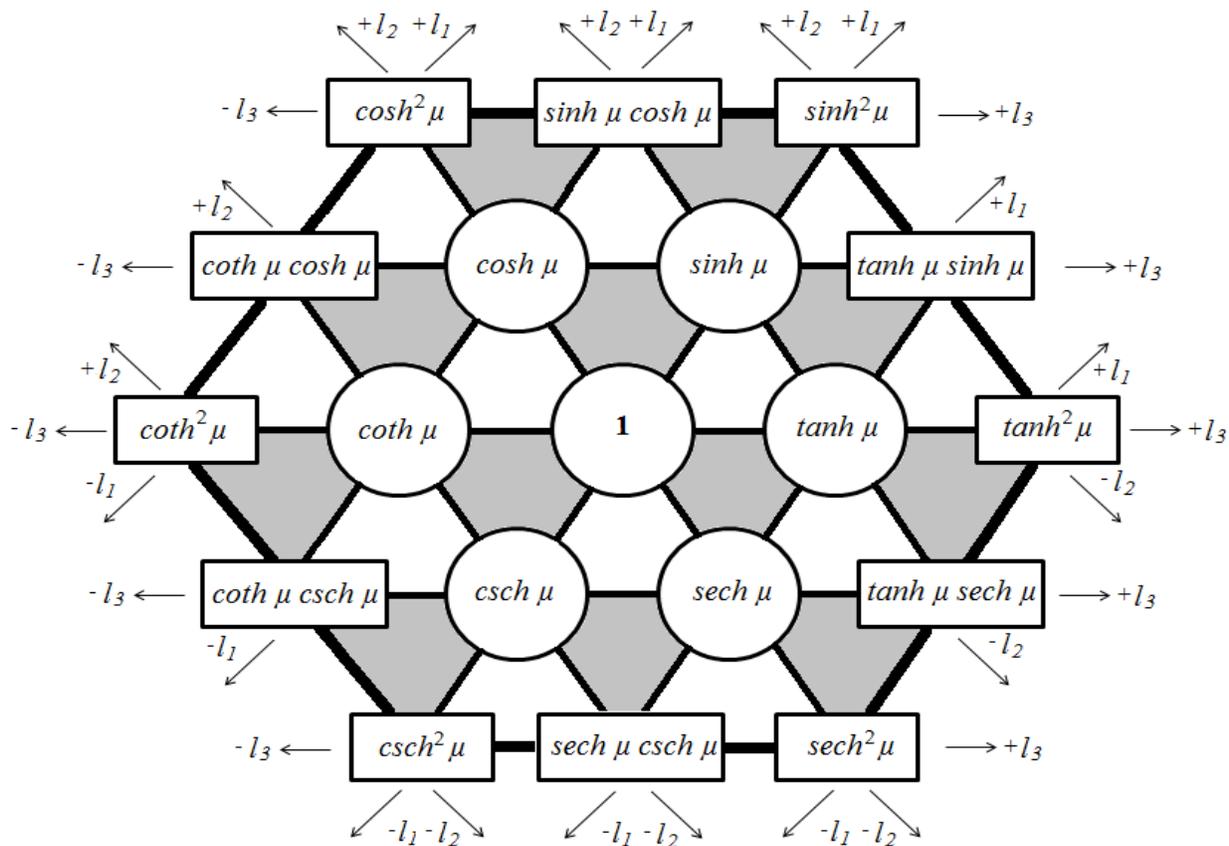


Figure 3: level_2 Chi-Toms Graph of Hyperbolic Functions

Property 1: With respect to the shaded regions of upside down triangles, the sum of squares of items in the right and bottom corner nodes will be equaled to the squared of the value in the upper left corner node.

Property 2: With respect to any three connected triple nodes on the second layer of the level_2 of Chi-Toms graph of hyperbolic functions, taking the product of the values from two end nodes, and replacing the power value, α , by $\alpha' = \alpha - \text{floor}\left(\frac{\alpha}{2}\right)$, the resultant will be the value of the middle node.

Sample case_2: For the connected triple nodes, $[\text{coth}^2 \mu] - [\text{cosh } \mu \text{ coth } \mu] - [\text{cosh}^2 \mu]$, the product of the value from two end nodes is $[(\text{cosh } \mu)(\text{coth } \mu)]^2$. Replacing the power value $\alpha = 2$ by $\alpha' = 2 - \text{floor}\left(\frac{2}{2}\right) = 1$, the resultant is $(\text{cosh } \mu)(\text{coth } \mu)$, which is the value as in the middle node.

Sample case_3: For the connected triple nodes, $[\text{cosh } \mu \text{ coth } \mu] - [\text{cosh}^2 \mu] - [\text{sinh } \mu \text{ cosh } \mu]$, the product of the values from two end nodes is $\text{cosh}^3 \mu$. Replacing the power value $\alpha = 3$ by $\alpha' = 3 - \text{floor}\left(\frac{3}{2}\right) = 2$, the resultant is $\text{cosh}^2 \mu$, the same value as in the middle node.

Property 3: With respect to any three adjacent nodes between two layers with two nodes at the second layer and one node at the first layer and having oblique angle at the center node (e.g. $(\text{sinh}^2 \mu) - (\text{sinh } \mu)(\text{tanh } \mu) - (\text{tanh } \mu)$), replacing each power value α , by $\alpha' = \alpha - \text{floor}\left(\frac{\alpha}{2}\right)$, the resultant will be the same as the value of the middle node.

Sample case_4: For the connected triple nodes, $(\text{coth}^2 \mu) - (\text{cosh } \mu)(\text{coth } \mu) - (\text{cosh } \mu)$, the value of the middle node can be obtained in two steps. Initially, we take the product of two end nodes, which is $\text{coth}^2 \mu \text{ cosh } \mu$. We then replace the power value of $\text{coth } \mu$, $\alpha = 2$ by $\alpha' = 2 - \text{floor}\left(\frac{2}{2}\right) = 1$, and replace the power value of $\text{cosh } \mu$, by $1 - \text{floor}\left(\frac{1}{2}\right) = 1$ the resultant will be $\text{cosh } \mu \text{ coth } \mu$.

Extending one layer outwardly along l_1, l_2 and l_3 respectively, we have level_3 Chi-Toms Graph of Hyperbolic Functions (figure 4).

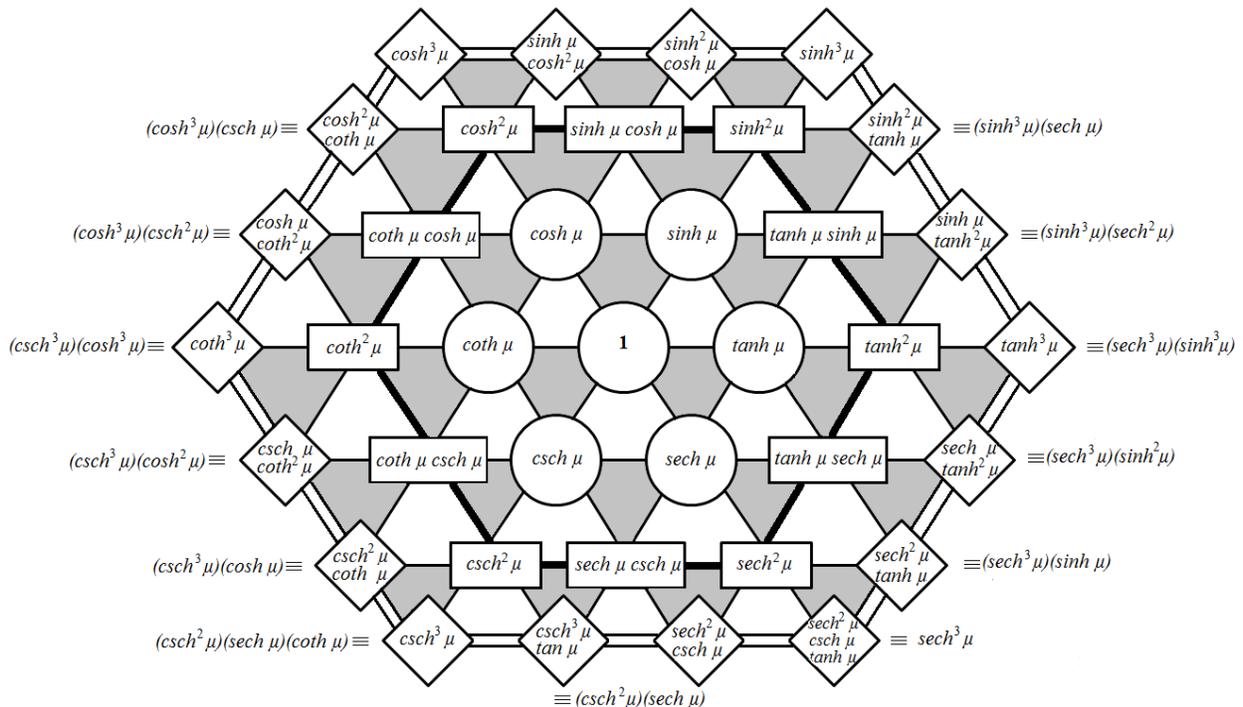


Figure 4: level_3 Chi-Toms Graph of Hyperbolic Funtions

It is trivial that, properties 1, 2 and 3 are also valid.

3. EMBEDDED PYTHAGOREAN RELATIONSHIP. The embedded Pythagorean relationship can be represented in terms of nine layer_2 Chi-Toms identities and fifteen layer_3 Chi-Toms identities.

Layer_2 Chi-Toms Identities: There are nine equations, which can be derived from the shaded regions of level_2 Chi-Toms Graph, starting from the upper left corner position in clockwise direction.

$$\begin{aligned} \cosh^4 \mu + (\cosh^2 \mu)(\cosh^2 \mu) &= \cosh^2 \mu \dots\dots (4) \\ (\sinh^2 \mu)(\cosh^2 \mu) + \sinh^4 \mu &= \sinh^2 \mu \dots\dots (5) \\ \sinh^2 \mu + (\tanh^2 \mu)(\sinh^2 \mu) &= \tanh^2 \mu \dots\dots (6) \\ \tanh^2 \mu + \tanh^4 \mu &= (\tanh^2 \mu)(\operatorname{sech}^2 \mu) \dots\dots (7) \\ \operatorname{sech}^2 \mu + (\tanh^2 \mu)(\operatorname{sech}^2 \mu) &= \operatorname{sech}^4 \mu \dots\dots (8) \\ \operatorname{csch}^2 \mu + \operatorname{sech}^2 \mu &= (\operatorname{sech}^2 \mu)(\operatorname{csch}^2 \mu) \dots\dots (9) \\ (\coth^2 \mu)(\operatorname{csch}^2 \mu) + \operatorname{csch}^2 \mu &= \operatorname{csch}^4 \mu \dots\dots (10) \\ \coth^4 \mu + \coth^2 \mu &= (\coth^2 \mu)(\operatorname{csch}^2 \mu) \dots\dots (11) \\ (\coth^2 \mu)(\cosh^2 \mu) + \coth^4 \mu &= \coth^2 \mu \dots\dots (12) \end{aligned}$$

Layer_3 Chi-Toms Identities: There are fifteen equations, which can be derived from the shaded regions of level_3 Chi-Toms Graph, starting from the upper left corner position in clockwise position.

$$\begin{aligned} \cosh^6 \mu + (\sinh^2 \mu)(\cosh^4 \mu) &= \cosh^4 \mu \dots\dots\dots(13) \\ (\sinh^2 \mu)(\cosh^4 \mu) + (\sinh^4 \mu)(\cosh^2 \mu) &= (\sinh^2 \mu)(\cosh^2 \mu) \dots(14) \\ (\sinh^4 \mu)(\cosh^2 \mu) + \sinh^6 \mu &= \sinh^4 \mu \dots\dots\dots(15) \\ \sinh^4 \mu + (\sinh^4 \mu)(\tanh^2 \mu) &= (\tanh^2 \mu)(\sinh^2 \mu) \dots\dots\dots(16) \\ (\tanh^2 \mu)(\sinh^2 \mu) + (\sinh^2 \mu)(\tanh^4 \mu) &= (\tanh^4 \mu) \dots\dots\dots(17) \\ \tanh^4 \mu + \tanh^6 \mu &= (\operatorname{sech}^2 \mu)(\tanh^4 \mu) \dots\dots\dots(18) \\ (\tanh^2 \mu)(\operatorname{sech}^2 \mu) + (\operatorname{sech}^2 \mu)(\tanh^4 \mu) &= (\operatorname{sech}^4 \mu)(\tanh \mu) \dots(19) \\ \operatorname{sech}^4 \mu + (\operatorname{sech}^4 \mu)(\tanh^2 \mu) &= \operatorname{sech}^6 \mu \dots\dots\dots(20) \\ (\operatorname{sech}^2 \mu)(\operatorname{csch}^2 \mu) + \operatorname{sech}^4 \mu &= (\operatorname{sech}^4 \mu)(\operatorname{csch}^2 \mu) \dots\dots\dots(21) \\ (\operatorname{csch}^4 \mu) + (\operatorname{sech}^2 \mu)(\operatorname{csch}^2 \mu) &= (\operatorname{csch}^6 \mu)(\tanh^2 \mu) \dots\dots\dots(22) \\ (\operatorname{csch}^4 \mu)(\coth^2 \mu) + \operatorname{csch}^4 \mu &= \operatorname{csch}^6 \mu \dots\dots\dots(23) \\ (\operatorname{csch}^2 \mu)(\coth^4 \mu) + (\coth^2 \mu)(\operatorname{csch}^2 \mu) &= (\operatorname{csch}^4 \mu)(\coth \mu) \dots\dots(24) \\ \coth^6 \mu + \coth^4 \mu &= (\operatorname{csch}^2 \mu)(\coth^4 \mu) \dots\dots\dots(25) \\ (\cosh^2 \mu)(\coth^4 \mu) + (\coth^2 \mu)(\cosh^2 \mu) &= \coth^4 \mu \dots\dots\dots(26) \\ (\cosh^4 \mu)(\coth^2 \mu) + \cosh^4 \mu &= (\coth^2 \mu)(\cosh^2 \mu) \dots\dots\dots(27) \end{aligned}$$

Additional eleven more equivalent identities are also listed for related reference.

$$\begin{aligned} \sinh^4 \mu + (\sinh^6 \mu)(\operatorname{sech} \mu) &= (\tanh^2 \mu)(\sinh^2 \mu) \dots\dots\dots (16)' \\ (\tanh^2 \mu)(\sinh^2 \mu) + (\sinh^6 \mu)(\operatorname{sech}^4 \mu) &= (\tanh^4 \mu) \dots\dots\dots (17)' \\ \tanh^4 \mu + (\sinh^6 \mu)(\operatorname{sech}^6 \mu) &= (\operatorname{sech}^6 \mu)(\sinh^4 \mu) \dots\dots\dots (18)' \\ (\tanh^2 \mu)(\operatorname{sech}^2 \mu) + (\sinh^6 \mu)(\operatorname{sech}^6 \mu) &= (\operatorname{sech}^6 \mu)(\sinh^2 \mu) \dots\dots (19)' \\ \operatorname{sech}^4 \mu + (\operatorname{sech}^4 \mu)(\tanh^2 \mu) &= (\operatorname{sech}^4 \mu)(\operatorname{csch} \mu)(\tanh^2 \mu) \dots\dots (20)' \\ \operatorname{csch}^4 \mu + (\operatorname{sech}^2 \mu)(\operatorname{csch}^2 \mu) &= (\operatorname{csch}^4 \mu)(\operatorname{sech}^2 \mu) \dots\dots\dots (22)' \\ (\operatorname{csch}^6 \mu)(\cosh^2 \mu) + \operatorname{csch}^4 \mu &= (\operatorname{csch}^4 \mu)(\operatorname{sech}^2 \mu)(\coth^2 \mu) \dots\dots (23)' \\ (\operatorname{csch}^6 \mu)(\cosh^4 \mu) + (\coth^2 \mu)(\operatorname{csch}^2 \mu) &= (\operatorname{csch}^6 \mu)(\cosh^2 \mu) \dots\dots (24)' \\ (\operatorname{csch}^6 \mu)(\cosh^6 \mu) + \coth^4 \mu &= (\operatorname{csch}^6 \mu)(\cosh^4 \mu) \dots\dots\dots (25)' \\ (\cosh^6 \mu)(\operatorname{csch}^4 \mu) + (\coth^2 \mu)(\cosh^2 \mu) &= \coth^4 \mu \dots\dots\dots (26)' \\ (\cosh^6 \mu)(\operatorname{csch}^2 \mu) + \cosh^4 \mu &= (\coth^2 \mu)(\cosh^2 \mu) \dots\dots\dots (27)' \end{aligned}$$

4. FURTHER REMARKS AND OBSERVATIONS. Hyperbolic functions can be useful in tracing hyperbolic trajectories such that the ordered pair $p = (\cosh \mu, \sinh \mu)$ satisfies the hyperbolic equation with foci on the x-axis: (figure 5)

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, \text{ where Center-to-focus distance: } C = \sqrt{a^2 + b^2};$$

$$\text{Distance between origin and } P: \frac{1}{\sqrt{2}} \sqrt{c^2 \cosh 2\mu + (a^2 - b^2)};$$

$$\text{Foci: } \pm (C, 0);$$

$$\text{Vertices: } (\pm a, 0);$$

$$\text{Asymptotic: } y = \pm \frac{b}{a} x;$$

Clearly, the area of the triangle region ΔOPQ will be equaled to the sum of the area of the concaved region POA, and the area of the convex region PAQ.

Therefore, we have

$$\frac{1}{2} ab (\sinh \mu) (\cosh \mu) = \text{Area}(POA) + \text{Area}(PAQ),$$

$$\text{where } \text{Area}(PAQ) = \int_a^{a \cosh \mu} \frac{a}{b} \sqrt{x^2 - a^2} dx \text{ and } (\sinh \mu) (\cosh \mu) = \frac{1}{2} \sinh 2\mu.$$

$$\text{Hence, } \frac{1}{4} ab \sinh 2\mu = \text{Area}(POA) + \frac{b}{a} \int_a^{a \cosh \mu} \sqrt{x^2 - a^2} dx \dots (25)$$

Taking differentiation operation with respect to μ on both sides of previous equation, and through the application of fundamental theorem of calculus, we get

$$\frac{1}{2} ab \cosh 2\mu = \frac{d}{du} (\text{Area}(POA)) + \left(\frac{b}{a}\right) (a \sinh \mu) (a \sinh \mu), \text{ or}$$

$$\frac{d}{du} (\text{Area}(POA)) = ab \left[\frac{1}{2} \cosh 2\mu - \sinh^2 \mu \right].$$

Combining the boundary value condition: $\text{Area}(POA) = 0$ when $\mu = 0$, as well as the identity of the form, $\cosh 2\mu = 2\sinh^2 \mu + 1$, we have

$$\frac{d}{du} (\text{Area}(POA)) = \frac{1}{2} ab, \text{ and } \text{Area}(POA) =$$

$$\frac{1}{2} ab \mu \dots (26)$$

By Taylor series expansions of $e^{2\mu}$ & $e^{-2\mu}$, we get

$$e^{2\mu} = 1 + (2\mu) + \frac{(2\mu)^2}{2!} + \dots = \sum_{n=0}^{\infty} \frac{(2\mu)^{2n}}{n!},$$

$$e^{-2\mu} = 1 + (-2\mu) + \frac{(-2\mu)^2}{2!} + \dots = \sum_{n=0}^{\infty} \frac{(-2\mu)^{2n}}{n!},$$

$$\text{and } \sinh 2\mu = \frac{1}{2} (e^{2\mu} - e^{-2\mu}) = \sum_{n=0}^{\infty} \frac{(2\mu)^{2n+1}}{(2n+1)!} \dots (27)$$

From equation 25, we have

(area of the convex region PAQ)

$$= \frac{1}{4} ab \sum_{n=0}^{\infty} \frac{(2\mu)^{2n+1}}{(2n+1)!} - \frac{ab}{2} \mu = \frac{1}{4} ab \sum_{n=1}^{\infty} \frac{(2\mu)^{2n+1}}{(2n+1)!} \dots (28)$$

The relationship between hyperbolic functions and trigonometric functions can be established indirectly through Taylor series of various functions. We can find the Taylor series for $e^{i\mu}$ and $e^{-i\mu}$ by substituting $i\mu$ and $-i\mu$ for x in the Taylor series for e^x :

$$e^{i\mu} = 1 + (i\mu) + \frac{(i\mu)^2}{2!} + \frac{(i\mu)^3}{3!} + \dots + \frac{(i\mu)^n}{n!} + \dots = \sum_{n=0}^{\infty} \frac{(i\mu)^n}{n!} \dots (29)$$

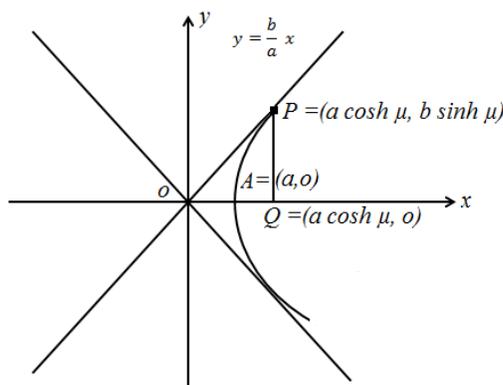


Figure 5: Hyperbolic Trajectory

$$e^{-i\mu} = 1 + (-i\mu) + \frac{(-i\mu)^2}{2!} + \frac{(-i\mu)^3}{-3!} + \dots + \frac{(-i\mu)^n}{n!} + \dots = \sum_{n=0}^{\infty} \frac{(-i\mu)^n}{n!} \dots (30)$$

Hence,

$$\sinh i\mu = \frac{1}{2}(e^{i\mu} - e^{-i\mu}) = \sum_{n=0}^{\infty} \frac{(i\mu)^{2n+1}}{(2n+1)!} = i \sum_{n=0}^{\infty} \frac{(i)^{2n}(\mu)^{2n+1}}{(2n+1)!}$$

Since, $(i)^{2n} = (-1)^n$, then we have

$$\sinh i\mu = i \sum_{n=0}^{\infty} \frac{(-1)^n(\mu)^{2n+1}}{(2n+1)!} = i \sin \mu \dots (31)$$

Combining equation (29) and (30), we thus have

$$\cosh i\mu = \frac{1}{2}(e^{i\mu} + e^{-i\mu}) = \sum_{n=0}^{\infty} \frac{(i\mu)^{2n}}{(2n)!} = \sum_{n=0}^{\infty} \frac{(-1)^n(\mu)^{2n}}{(2n)!} = \cos \mu \dots (32)$$

And $\tanh i\mu = \frac{\sinh i\mu}{\cosh i\mu} = \frac{i \sin \mu}{\cos \mu} = i \tan \mu \dots (33)$

Replacing $i\mu$ by x or μ by $-ix$ in equation (31), we have

$$\sinh x = i \sin(-ix) = -i \sin ix \dots (31)'$$

By the same taken, we also have two more equivalent forms of equations (32) and (33), such that

$$\cosh x = \cos ix \dots (32)'$$

$$\tanh x = -i \tan ix \dots (33)'$$

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ALBERT Y. CHI received his Ph.D. in Statistics from Oklahoma State University in 1979. He is an assistant/professor of Mathematics at University of Maryland Eastern Shore. He serves on the editorial boards of International Journal of Science & Informatics. He enjoys solving mathematics problems.
Department of Mathematics and Computer Science, University of Maryland Eastern Shore, Princess Anne, MD21853

albertchisquare@gmail.com

JONATHAN D. TOMS is currently working on his B.S. from the University of Maryland Eastern Shore in 2012. His interests include digital signal processing, (digital) circuit design, remote sensing, AutoCAD, embedded system design and electromagnetic systems. His post college work was working on communication systems and radar systems.

Department of Engineering and Aviation Sciences, University of Maryland Eastern Shore, Princess Anne, MD21853

toms_jonathan@yahoo.com

Malware Types and Categories, Current Malware Counts and What They are Trying to get From Mobile Devices

Andres A. Fuentes

Department of Technology, Natural Sciences Math & Technology

Regent University

1000 Regent University Drive

Virginia Beach, VA 23464

e-mail: andrfue@mail.regent.edu

Sara J. Forkey

Department of Technology, Natural Sciences Math & Technology

Regent University

1000 Regent University Drive

Virginia Beach, VA 23464

e-mail: sarafo1@mail.regent.edu

ABSTRACT

In this Research paper we will identify various Malware types and Categories for Mobile Devices. Furthermore we will discuss the different types and current malware affecting mobile devices. Additionally, We will inform what are hackers trying to get from these mobile devices, while revealing and providing and expected grow rate for malwares attacking Mobile Devices.

1. Introduction

The World of Technology is very fascinating, interesting and rewarding. However, technology also has another side, which is not so rewarding. For instance, hackers are always on the move and trying to intercept and hack our communications, transmissions, and steal our information by all means possible. In order for hackers to intercept and steal our personal information they have to use various tools such as software programs, malicious codes, malware, virus and any other means that they can get their hands on. Meanwhile, we ask, what are they trying to get besides our personal information? Furthermore, in the early 2000 their primary targets were Desktop Computers, Laptops, servers, or any other computer devices. However, their intentions still the same as they are currently shifting their attacks from laptops and desktops to mobile devices. So, what type of malware and categories are there for mobile devices? How many types are currently out there. Furthermore, what is their growth rate and expectancy? This research paper will cover these questions and many more with the intention to offers more awareness of the currents malware threats to mobile devices.

In the first place, regarding malwares types we can start by stating the definition of malware. According to Reavis (2012) suggest, "Malware is software designed to attack and damage, disable, or disrupt computers, computer systems, or networks" (1). This definition of malware is important to know in order to understand and recognize the negative impacts, and consequences malwares can have on any computer system, especially mobile

devices. Furthermore, today we have many different types and categories of malware that are constantly seeking to cause damage to users personal computers and mobile devices.

Today millions of people are connected online on the World Wide Web. While the proper use of Internet can be very productive and time saving for some, for instance, sending emails, purchasing clothes and accessories online, and even paying bills. For others, this is the opportunity to develop and design malicious software code to harm and steal other peoples' computers and personal information. So, how many types of malware exist today, how many are current, and can we expect to see a grow of malwares in the future especially those affecting mobile devices. Furthermore how important is the awareness and prevention of malware on portable devices? For instance, as suggested by the website Gartner.com (2013) "By 2018, 70% of mobile professional will conduct all of their work on personal smart devices" (p.1).

Therefore, the topic of malware and how they affect mobile devices is very important for the future of technology and users. Consequently is important to understand some of the most common types of malwares. For instance, on Android operating systems the, "Top five most commonly detected malware on android are PJApps-C, BBridge-A, Generic-S, BatteryD-A, and DrSheep-A" (Rashid, 2012, p.1). Keep in mind this is only a short list of the thousands and possible millions of malware that are currently in circulation, especially affecting Android operating systems. It would be impossible to write about every single malware that is in existence out there today because there are too many to quantify a number.

2. Malware types and categories

Malicious malware is developed to attack and infiltrate any mobile devices with various types and categories. For instance, malware also comes in many different categories regardless of the operating systems that they operate in. For instance, as suggested in the 2011 Juniper Network *Mobile Threats Report*, (2012) "The vast majority of malware infecting smartphones and tablets can be classified into two categories: spyware and SMS Trojans. While profit is the major motive for both types of attacks, their design is fundamentally different" (p.7). This statement is vastly important because it points out the most common two categories of malicious malware. However, there are other categories for example, such as computer virus or a worm. In my opinion, malware can be created in various types and can be presented with many different types of categories in order to create vulnerability in any mobile device Operating system and/or platform.

3. What are the different types of malware out there?

We can evaluate the functionality and explore more in detail the various aspects of malwares. For instance, Felt, Finifter, Chin, Hanna, and Wagner, (2011), suggests, "Malware provides no legal notice to the affected user. This threat includes Trojans, worms, botnets, and viruses. Malware is illegal in many countries, including the United States, and the distribution of it may be punishable by jail time" (p.2). This statement is an excellent point to elaborate more in this research.

Hackers do understand the law, regulations, and negative consequences of their actions. However, they still violate a code of ethics in information technology and continue to challenge the security of many mobile devices. In my opinion, many hackers do in fact, develop different types of malware with the intentions to steal and gain personal information that can be profitable online. However, many do it just for the rush, and the enthusiasm to create something illegal and be responsible for affecting others' mobile devices. I do not agree with their views and ideas, however, the most I can do is create more awareness thru this research.

Also how and why such a tremendous awakening in the developing and creation of thousands of malware types for mobile devices? In my opinion, back in the early 90's cellular phones sold to the public did not have Internet or such high technology with many new capabilities and different features. Through the years, the demand from new professionals, government operations, and men's imaginations has lead to the creation of the smartphone. Another impact of the new comings of the smartphone is the high demand by professionals in all fields, University students, and even the layperson. Today, most people own a smartphone. For instance, as suggested by Schmidt (2011), "Malware writers might have feared a decreasing number of possible victims motivating them to increase their efforts on malware creation" (p.51). These words by Schmidt are a clear representation of why hackers are continuously in the move to design malwares in order to steal personal information.

Furthermore malware writers are covering all different platforms and/or operation system for mobile devices. This is a critical vulnerability for anyone who uses mobile devices. In addition to the developing of malwares for mobile devices, Schmidt (2011) answers the severity of malwares future development; “smartphone malware increased from year 2004 on and by the end of 2010, more than 500 malwares will have appeared. While most of the smartphone malwares are Trojan horses manipulating the system, the share of profit-oriented malware increases steadily” (p.69). These numbers are amazing and represent a clear and present danger to the security of mobile devices. Furthermore, these numbers should be a warning that if this issue is not taken seriously and resolved then the consequences could be catastrophic and could cost millions of dollars to fix the problem. We need to stop the progress of malware development or at least deter it as best we can.

Everyday hackers are constantly motivated by economic gain and potential profits that leads them to continue to develop more malware. However, there are many operating systems that are the platforms of many smartphones or any mobile devices. While some operating systems are more secure than others, the bottom line is that all of the operating systems are some how vulnerable to all categories of malware. More specifically, people often do mention that the Android operating systems is less secure than the Apple operating systems. However, this is not necessary the case for instance, as suggested by Mylonas, Dritsas, Tsoumas, & Gritzalis, (2011), “The applica- tion testing criteria are also not available, apart from the rejection of not official Apple’s API usage. This security mechanism may be circumvented by a sop- histicated attacker using encrypted payloads and lo- gic bombs on the binaries” (p.9). This statement is very important because it clearly explains how regardless of the Operating Systems that your mobile devices uses it will never be 100% secure and safe from malware attacks from hackers.

Now, what are some of the most current treatments and current awareness’ for the different types and categories of malware for mobile devices? For instance, a current problem for mobile user devices is malicious malware. Fortunately, today there are many tools and new avenues to protect a users mobile device against malware. For instance, as suggested by Jakobsson, Shi, Golle, & Chow (2009) “We can defend against cloning attacks by having packets signed by a SIM card which is hard to clone” (p.2). This approach is significantly important because it responds in a positive way to the current threat of malware for mobiles devices. Consequently, this statement also sends out a message to hackers designing malware that they are not going to succeed in their endeavors. As a result, this and other techniques can help fight the war against malware specifically against malware devices.

Meanwhile, another important aspect of malware affecting mobile devices is regarding some of the most current awareness of our research topic. For instance, as suggested in the website ESET.com (2013) explains, “The number of malware variants for Android has also increased in 2012. A variant is a modified version of a specific and known malicious program” (p.6). This statement is important because it analyzes and describes how hackers are furiously continuing to improve their techniques and changing their skills to try to stay ahead of technology and continue to hack other users mobile devices. On the other hand, in my opinion cyber security professionals are going to continue to be challenged by hackers.

In my opinion, regardless of the newest and greatest tools and techniques to stop malware attacks Cyber security specialists have to stay up to date and try to be a step ahead of hackers in order to maintain and provide the greatest level of security to mobile devices users. Furthermore, understanding and analyzing the different approaches and mediums that hackers use to introduce new malware to mobile devices is a critical point the prevention and awareness of malwares. Moving on to another aspect in the current awareness of malware for mobile devices. Current and future mobile devices users also have the responsibility to stay informed and learn skills necessary to avoid being a victim of malware in their smartphones, tablets, and any other mobile devices.

In the constant battle against hackers, the minimization and prevention of malwares, users also play an important role. For instance, mobile device users should be responsible for staying informed on the current trends of malware for mobile devices. In my opinion, understanding the type of mobile device the user is buying and the operating software is critical in the prevention of malware. For instance, reading recent articles, reports, and magazines about malware for mobile devices is an excellent way to stay informed and prevent intrusion of malicious software into their mobile devices.

In addition, mobile device users should avoid downloading and purchasing applications from unknown sources. I understand that sometimes users are tempted to purchase applications that are cheap and in some cases are free. However, when applications are too cheap or it appears that one is getting an excellent deal, this is the excellent circumstance that hackers are waiting for to infiltrate their mobile devices. Furthermore, users should be wise when shopping online or checking their online bank account statements from the convenience of their mobile devices without proper safeguards in place.

These are the primary targets for hackers. For instance as suggested by Markelij, & Bernik (2012) “the protection of operating systems for mobile devices is continually getting better, and (2) the “quality” of malware is also continually improving” (p.100). This statement is important because it demonstrates the level of competition between hackers and cyber security professional to continue the progress of implementing new ways to stay ahead with the newest and greatest innovative ideas on the prevention of malware in mobile devices. Furthermore in many occasions, the mobile device users are singlehandedly the ones that put themselves in the position or circumstance for hackers to take advantage of their sloppy mistakes and/or irresponsibility.

Next, how vast is the problem of hackers attacking mobile devices users spread across the country? For instance, is it only in the United States or Canada? Are the cybercriminals attacking mobile devices with malware worldwide? In my own opinion, millions and millions of people nowadays have a cell phone and they also carry smartphones. They utilize these devices everywhere they go. They can listen to music on their commute to work on the bus or train and they can access their bank accounts from the convenience of their phones. For example, mobile devices like, smartphones and tablets are increasingly becoming more attractive and are more popular than any other computers. The advantages of mobile devices is they can be carried all around the world, due to being lightweight and portable, and have the same capabilities and functionality everywhere they go. However, with such amazing technology comes too a lots of risk and vulnerabilities and security concerns.

As described by Milligan & Hutcheson (2007), “SNARF attack – access to stored data portions of the phone or other mobile equipment without owner’s knowledge Blackjacking – hacking into an enterprise system using a blackberry” (p.191). These categories of malwares are important. Not only to know them but to understand their functionality as well because they are very dangerous and if they infiltrate your system they can do lots of damage to your personal mobile device.

4. What are they trying to get from the mobile devices?

What hackers are trying to gain from breaking into users mobile devices is information. They steal personal information such as credit card numbers, social security numbers, birthdates, and addresses and use them to open lines of credit to purchase whatever they would like. There are many ways in which hackers steal the information from the users mobile device. They can exploit a users smartphone with an app called PlaceRaider. The PlaceRaider is “an Android app that remotely exploits the camera and secretly snaps a picture every two seconds, there has not been as much research into exploiting DSLR Wi-Fi-enabled cameras. However, security researchers from ERNW changed that by showing how to exploit vulnerabilities in order to steal photos and turn a DSLR camera into a spying device” (Smith 2013) The user might not know that their smartphone has been compromised and that the hacker is utilizing it to take pictures. The hacker can also access the smartphones’ photo library and take whatever pictures they want to that are in this storage straight from the phone itself. This is a very scary piece of malware that is in circulation. They can utilize these pictures for anything that they want to from passport photos to any number of documents that they would need to steal someone’s identification.

Another growing trend is to bring your own device to work, otherwise known as BYOD. This is a great option for many users because they feel comfortable utilizing their own piece of equipment, such as a tablet or laptop to do their everyday activities at work. This promotes greater morale in the workplace, higher productivity rates, and a greater sense of job satisfaction. However, with a user bringing in their own piece of equipment into the company to work off of, it is harder for the company to keep track of the users equipment and almost nearly impossible to place safeguards on all the equipment that everyone brings into the company. This is an ideal situation for hackers to come in and place malicious software onto these devices and steal any information that they would like off of all the equipment that is not safeguarded. “Research shows that only one in three Americans realize they can get malware—malicious software designed to steal login credentials or other personal information—on their mobile phones. Yet hackers are increasingly focused on mobile malware, which skyrocketed in the first half of 2012 with more than 10,500 new strains of mobile detected compared to less than 1,000 in all of 2011, according to antivirus maker McAfee” (Gemalto, 2013)

It is the responsibility of everyone to make sure that their mobile devices are safeguarded from malicious malware attacks. Whether the user chooses to bring their device to work or utilizes their devices at home, there are measures that can be taken to reduce the risk of infecting the device with malicious malware. Remaining vigilant by the user knowing that they are constantly at risk and how to protect their mobile devices is a great way to keep one step ahead of malicious hackers.

5. Growth Trend for Malware

The growth trend for malware is expected to rise exponentially this year as it has in previous years. There are more mobile devices now than there were in the previous years and this means that there are more ways for malicious hackers to infect these devices with their malicious malware. From the year 2010, there have been great strides made with mobile devices, especially with the Android device. This, unfortunately, was also the year that FakePlayer emerged. This was the first malware that was developed to target the Google platform. From then on, malware had begun to grow at a rapid rate and thus the complexity at which they were developed was growing as well. This made it extremely difficult for professionals to keep track of all of the expanding malicious codes being utilized and therefore made it difficult for these same professionals to come up with safeguards for all the malware being placed into circulation. However, as the amount of malware increased, so did the amount of safeguards against them. "In 2012 the amount of unique detections grew 17 times globally compared to 2011." (ESET, 2013, p.4) Not only have we seen a growing trend in the amount of malicious malware, we have also seen a growing upward trend with the amount of malware variants, especially for the Android platform. "A variant is a modified version of a specific and known malicious program. Cybercriminals modify the structure and the code of an existing threat to create a new one with the aim of adding new malicious functions and evading detection by antivirus programs." (ESET, 2013, p.6) We will never be completely rid of malicious malware and hackers, but as long as we place safeguards on our mobile devices to protect them against these attacks we will always gain a major advantage over the enemy.

6. How many malware are there currently?

There are so many different types of malware from Trojan Horses to worms, but also in these categories there are also an array of different kinds of malware that can affect your mobile devices. In 1999 there was a malware that came to light called Melissa and another in 2000 called LoveLetter. These were both email based and were spread through intrusion to users computers via an enclosed attachment on the users email. When the user would open the attachment, the virus would overwrite files on the users computer and instantly find the users contact list and email itself out to other users via their email account. In 2001, a worm emerged called Code Red. This was a very specific worm, which targeted only the Microsoft Internet Information Services. In 2001, the Win32/Sircam came to light and this went as far as affecting the President of the Ukraine's computers. In 2004, the earliest example of a botnet emerged on scene. It was called the Win32/Mydoom and these are particularly gruesome because they are "secretly and illicitly controlled by an attacker, who orders them to perform activities such as sending spam, hosting pages used in phishing attacks, stealing passwords or sensitive information, and distributing other malware." (Microsoft Security Intelligence Report, 2012, p.7) With the creation of the Win32/Mydoom, it was apparent to professionals that the criminals were gaining profit from these acts of malware and they were not just creating and spreading the malware to wreak havoc. In 2005, the Win32/Zotob worm was created and this was helpful for hackers because it blocked the pop-up blocker function on the users computers allowing hackers to display their ads for their websites that were full of malicious malware. In 2005, the Win32/Zlob trojan came into light and allowed the hackers to display their malware ridden pop-up ads pertaining to spyware and enticed the users to click on the ads to protect their computers from this spyware. When the user would click on the link their computer would be instantaneously infected with malicious malware. As you can see, the malware has been growing in intensity for quite some time and the attacks have been more severe than ever. These have grown from our personal computers, to our mobile devices such as our tablets and smartphones. There are so many different kinds of malware in existence, and more malware is being created and deployed everyday, that it is nearly impossible to quantify how much malware is being brought into circulation. The anti-virus programs that are available for purchase, only protect your mobile devices and computers from currently known malware and malware that is seen to be the most in current circulation. This does not mean that the user should not purchase anti-virus software for their devices, because it helps not only the user, but also the professional creating the software. They can monitor what malicious attacks are occurring and what steps need to be taken to update the software that they provide for the customer.

7. Conclusion

In conclusion, there are many different types and categories of malware affecting our mobile devices. Furthermore, the high demand for mobile devices has significantly increased over the years and the trend does not seem to be diminishing. The manufactures of these devices have made them more affordable now than ever before and this is very enticing for users. They also make our lives easier and more functional. Unfortunately, hackers have taken advantage of this increase and demand for mobile devices to design and create malware that will negatively impact our mobile devices. Hackers have many purposes why they want to create and spread malicious software to mobile devices. However, Cyber security professionals are continuing to improve and design ways to keep users mobile devices safe from many different types of malware. However, ultimately between the individual users, and cyber security professionals, everyone should be ultimately responsible to stay informed and up to date with the latest malware prevention awareness information. This is the only way to stay one step ahead of the malicious malware attacks and keep our information safe from hackers' ill intent.

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Role of Knowledge, Microfinance and Micro-enterprise in improving the Quality of life of the forest Dwellers: case studies from India

<p>Prof. Dr. S.Teki Professor and Head, Department of Management Studies Adikavi Nannaya University (Autonomous body under Government of Andhra Pradesh, India) Rajahmundry-533105, India. website www.nannayauniversity.info Phone: 91-8121692457 and +91-883-2472616-17, email: tekisunny@gmail.com</p>	<p>Prof. Dr. M. Suresh Babu Professor and Dean (Exam) Department of Management Studies Sri Venkateswara University Tirupati-517502, Andhra Pradesh, India Phone+91-877-2287905-906 Mobile Phone: +91-9393607035 Email: sureeshbaabum2@gmail.com</p>
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Key words: knowledge, microfinance, value addition, micro-enterprise forest dweller, NWFPs

Statement of the problem: Forest dwellers mainly rely upon forests and forests produce for their survival and growth. Forests function as provider, employer, caretaker and sustainer of forest dwellers. They win their bread by way of either exhausting or selling or bartering the Non-Timber Forest Produce (NWFP) like *madhuca indica*, *Emblica officinalis* etc. It has been estimated (Tewari, 1994) that many village communities derive as much as 17-35% of their annual household income from sale of the NWFP. About 19% of (Teki 1999) the money to meet their survival of the forest dwellers, offshoot from NWFP, collection and sale. The NWFPs cater to the different vital needs of industry and individual, are supplied by forests through forest dwellers. Despite this the forest dwellers do not have explicit knowledge about the importance of these NWFPs which is one of the reasons for poor quality life they live in for years together. If they are knowledgeable about the fact that NWFPs they supply are of immense value, then the scenario would have been different. That is they do not need suffer in living such a miserable conditions. Mere exposure about knowledge will not be sufficient to get out from the miserable conditions hence, their financial requirements should be provided to them. As they are not in the net of sophisticated organized financial system that have capital and money markets and also a regulator to over see their activities. The forest dweller should be brought under a semi-organized financial system that is emergent for the last one and half decade or so. Knowledge and micro finance (*financial services for unbankable poor people*) will give them stimuli to undertake various NWFPs value addition activities with the help of micro enterprises. The fruits of which will be manifold including, enhanced income level, income generating activities, improving quality of life etc. It was observed in the field that the forest dwellers generally finance their needs by way of advance trading of NWFP with traders. Thus meeting requirements of utmost basic needs of the forest dwellers at the time when they were in real financial crisis is exploited by the traders who offer to take NWFPs against their advances, at much lower value than the market value. Need for financial assistance in one hand and lack of knowledge about market and market value of NWFPs render the forest dwellers helpless. At the same end traders have accessibility to the market, knowledge about market value and end application of product which otherwise is not available to the forest dwellers leaving the poor people as they have been living miserably for years together. Due to the advances taken from the traders they are bound to sell their collections immediately with little value

addition or without value addition. Otherwise the same collections would have fetched more price. Hence, there is great potential for micro finance sector and knowledge to play a crucial role to safe guard the interest of the forest dwellers. The lack of knowledge about prevailing market for NWFP leaving them with little bargaining power, and market is unorganized that is leading to exploitation by channel members who would purchase these important forest produce at very lower price. And in turn these channel members sell the NWFP a premium price with or without any value addition due to their vast knowledge about markets and accessibility of logistics to reach the market. All these mainly lack of knowledge and micro financial support amongst the forest dwellers resulting in poverty of amongst the forest dwellers. This benefits neither forest dweller nor forest nor environment nor Government. If the forest dwellers are expose to NWFP market knowledge and provided with required micro finance support they will gradually come out from the clutches of the poverty, which is a dire need of the Current Global Society. The objectives of the paper are

The forest dwellers are generally exploited on accounts of (1) distress sale of their NWFP inventory and (2) lack of knowledge about NWFP markets and also (3) financial assistance to undertake value addition activities. The provisions for making forest dwellers knowledgeable about NWFP markets and micro finance will lead to the accruing following benefits to the forest dwellers:

- (a) Set free from the exploitation of money lenders and NWFP traders
- (b) generation of self employment opportunities inform of value additions to NWFP
- (c) conserving the forest and environment.
- (d) facilitation of setting up micro enterprise for NWFP value addition.

In the above context the paper was conceived with basic objective to study the contribution of knowledge about NWFP markets and end user value, supported by micro finance and micro enterprise in improving the forest dwellers quality of life.

The path for most of (*Margaret G., 1993*) rural areas (forest dwellers) to their sustainable economic development includes knowledgeable innovative approaches to natural resource conservation, management, and utilization. Improvement (www.oas.org-1996) of the people's access to knowledge and the availability of technology, promoting the dissemination and exchange thereof, will likely lead to sustainable economic development of the poor people.

What is Value addition to NWFP, it is any step (Pethiya and Teki 2003) taken to increase the value of a raw NWFP product at any stage between production and sales of the final product. Typical value addition includes capacity to store the product for sufficient time to avoid distress sale, processing in some way such as de-seeding, cleaning, cutting, decorticating, pulping, boiling, packaging, grading, storing, and smoking (baking/heating), drying, freezing, physical mixtures preparations (pickles, trifala powder etc.) extracting, or preserving.

Benefits of value addition: a) Higher returns b) Opens new markets C) Create brand recognition
Value additions not necessarily render high returns to the forest dwellers unless and until quality of the products and market and market information for the product are augmented.

Research studies (*Teki 1999*) show that forest dwellers approximately 50% (INR 6285) of the total survival accounts from NWFPs, fire wood, and other sources. This gives an insight the importance of forests for furnishing livelihood to the forest dwellers. As substantial portion of survival stems out from NWFP harvest and trade. The same inventory realizable value can be increased when they are given enough knowledge about the value addition methods and techniques and also provision for micro financial services that deprives from distress sale. Studies also reveals that the share of forest dwellers in total consumer price spread is ranging just from 11% to 26%. The following table depict in depth analysis of price spread selected NWFP harvest and trade.

Table 1.1 Price spread of selected NWFPs of study area in Orissa state, India.

Name of the product	Forest dwellers share		Share of local shopkeeper		NWFP traders 1		NWFP trader 2		Industry/processor	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
<i>Achar</i>	15.00	25.9`	24.00	15.5	32.00	13.8	--	--	58.00	44.8
<i>Madhuca indica</i>	2.50	22.7	3.50	9.09	5.00	13.63	9.00	36.36	11.00	18.22
<i>Mohual leaf</i>	3.50	11.11	---	---	5.75	7.15	--	--	31.50	81.78
<i>Tamarind</i>	2.00	20.0	3.00	10.0	4.50	15.0	5.00	5.00	10.00	50.00
<i>Tamarind seedles</i>	3.50	19.44	4.50	5.55	5.50	5.55	6.50	5.55	18.00	63.88

Sources: Teki Surayya *et.al* 2003

The share of P.C. (Primary collector/forest dwellers) can be enhanced from 20% upto 50-60% extent by evolving suitable strategies viz., providing knowledge to the forest dwellers (F.D) and efficient value addition through micro enterprise. Extending logistical facilities that are available to local trader or trader level can be instituted at F.D. level and this will indeed lead to give the benefit. Moreover the F.D. will be also required to have proper transportation arrangements that will enable them reach the market at appropriate time. Then who will develop this logistics and market knowledge is question to be asked and answer to be quested. The obvious answer would be the government, developmental agencies, should consider this has strategy to bring the forest dwellers from the vicious poverty web. If this is provided the forest dwellers can increase almost cent percent or even more in some cases. This increased earnings can enable the forest dwellers who are living in sheer poverty. As per (Mukhopadhyay 2004) the study analysis, on an average a poor family can get core consumption (infrastructure) basket (threshold level to come out from poverty net), if the family can set aside INR 8.6 per day (or INR 1.70 per person). Providing knowledge about value additions and markets to the F.D. will certainly enable them to set aside the amount as reckoned. This will let the forest dwellers to buy core consumption basket and get rid from poverty net.

As discussed above value addition to NWFP renders multiple benefits including generation of employment, improved earnings levels that lead to improving quality of life. This can corroborated from the following analysis that shows the benefits of the value additions to the forest dwellers.

Mohual (*Bauhinia vahlii*) leaves value addition : In the (*Pethiya and Teki 2003*) survey area of Paderu Forest division of Andhra Pradesh , primary collectors used to sell Mohual leaves without value addition @ Rs. 5 for one bundle of 100 leaves. The forest department has intervened and imparted training to the primary collectors to make leave plates with the help of compressor (technology) machine having value Rs. 50,000 (assumed). The incremental cost benefit of this technological intervention is as follows.

Incremental cost benefit analysis

Before value addition selling price of 200 Mohual leaves bundle was Rs. 10/-

After value addition selling price of 100 Mohual leave plate bundle is Rs. 90/-

(for making one mohual leave plate , two mohual leaves are required)

Cost of value addition for one bundle/unit of 100 leave plates:

		Rs.
a)	Cost of raw materials (Mohual leaves)	10.00
b)	Labor (stitching, compression, packing etc.)	30.00
	<i>I) Prime cost (a + b)</i>	<i>40.00</i>
c)	Electricity, wrapper, old news paper, plastic lamination etc.	15.00
	<i>II) Factory cost (I + c)</i>	<i>55.00</i>
d)	Selling and distribution expenses	

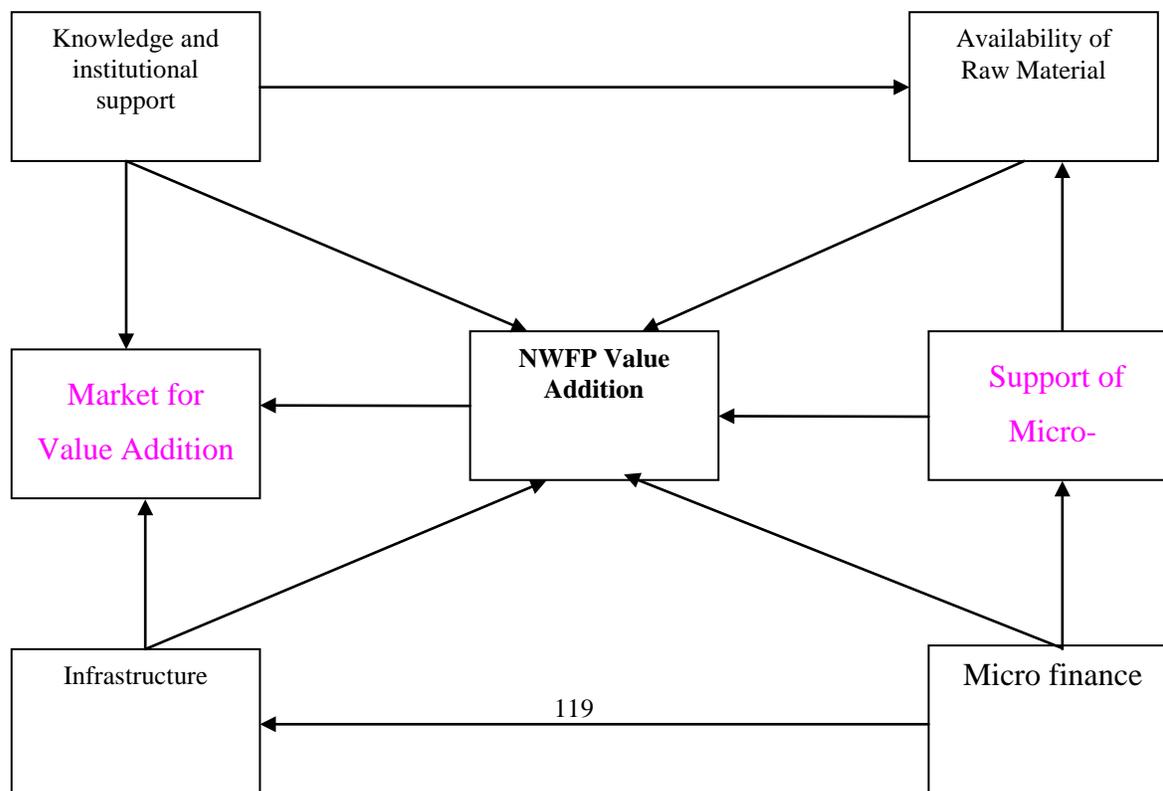
(Transportation and handling charges etc.)	05.00
III) Cost of sales (II + d)	60.00
IV) Profit (incremental benefit*)	30.00
V) Sales (one bundle/unit 100 leaf plates)	90.00

Incremental benefit = (Selling price per unit - Total cost) Rs. 90 – 60 = 30
 Cash flow per annum is Rs. 30 x 4 x 200 = Rs. 24,000/-

It can be inferred from the above analysis that, if, on an average a person can make one unit/bundle per day he will earn Rs. 60 (incremental benefit Rs. 30 + labour charges Rs. 30). The same task can be also performed by a SHG/DWCRA group of consisting 4 members and one machine can provide sufficient work per day for all 4 members enable the group to earn by and large Rs 240 per day. And the mohual leaves available most part of the year, particularly in Paderu division. However assuming in a year there would be maximum 200 working days and the total incremental benefit would be (Rs. 30 x 4 x200) Rs. 24,000 p.a. Assuming the venture last for 10 years, pay back period of the venture would be 2 year 4 months , NPV @ 10% Rs. 97470, @ 15% Rs. 70450, and IRR is 46%, which is very reasonable investment in any rural enterprise. If these four persons contribute Rs. 12,500 each and take up the venture they will get Rs. 6000, per annum for the contribution of Rs. 12,500/-, besides providing employment. This in turn will cultivate sustainable harvesting mohual leaves and also conserving the environment.

Knowledge is the (*webster’s dictionary-www.mcombs.utexas.edu/*) fact or condition of knowing something with familiarity gained through experience or association. Hence, the forest dwellers are exposed to know the NWFP end user value, way to reach the end user with a value added product that is suitable for consumption. This requires an integrated network through which the forest dwellers can reach the market to get remunerative price for their NWFP inventory. That eventually elevate the forest dwellers quality of living. The below is the network that is envisaged to attain this objective.

Fig. 1 Integrated network of Knowledge, Micro finance, Micro enterprise and NWFP value addition. (edited from report of Pethiya &Teki 2003)



The above figure depicting (Pethiya and Teki 2003) the integrated network of NWFP, which can work as good system to reap the value addition benefit to forest dwellers. The first step is knowledge about the available market for value added NWFPs. The efforts for value addition can be initiated and then accessibility of both exotic and /or endemic technology and micro-enterprise that suits to the purpose. Once the technology for setting up micro enterprise is available then the financial (micro) assistance to use such technology becomes the major input for carrying-out value addition. Micro credit not only act as facilitator to use required enterprise but also proves to be value added by way of arresting distress sale which makes the villager to resort on trader to sell their NWFP at throw away price. Once the finished product is ready then the most crucial part of the network is availability of market for that value added product. If market is also there, then infrastructure like roads and transportation is also vital, otherwise the chain between the producer and end-users may not be able to fasten and this will defeat the every objective of the network i.e. enhancing the livelihood of the primary collector throughout value addition and thus improving quality of life. Further there should a sort of institutional mechanism that will support and coordinate the whole NWFP value addition network thereby enable them villager to reap the value addition and micro credit fruits.

As has been discussed above that Knowledge, Microfinance and microenterprise (value additions) can do miracle to improve the living quality of the forest dwellers. The subtle remain unsolved here that who will purvey these vital input to the forest dwellers. The hoping ray is committed national and international developmental agencies and NGOs can shoulder this responsibility. It is envisaged (Pethiya, Bhattacharya & Teki 2003) that with the involvement of NGOs, in the study area it is possible to inculcate financial discipline amongst forest dwellers (SHG) by mobilizing their savings and making the SHGs active, to cater their micro financial requirement for themselves. It was experienced by the study team during field survey that the forest dwellers in addition to the credit, they will be better off if, some credit plus services particularly knowledge and marketing support for value added products are provided by the NGOs which can certainly ensure the success of their small enterprise.

Conclusion

Knowledge indeed is a powerful strategy to alleviate poverty. Causes for poverty (i.e. unaffordability for decent life) amongst the forest dwellers are many. Out of these, lack Knowledge (about markets & value of NWFP) Micro-finance and non-existence of micro enterprise for NWFP value additions are prominent causes. As any knowledgeable person can resist exploitation, if the forest dwellers are given knowledge about end user value of NWFP and small value additions, they will begin to resist the exploitation of traders initially. Further if they are provided with micro finance by any model (SHG, Gramin etc.) to finance their consumption needs and undertake entrepreneurial activities through micro finance, that would help them in enhancing their earnings. Which would lift them up from the miserable poor quality of life. Hence, providing knowledge about NWFP real market value and value additions, support of microfinance and microenterprise for value addition and also proper infrastructure to get their NWFP inventory to right market place, will benefit them immensely by resisting themselves against all exploitations. These in turn enable them to come out from the vicious trap of sheer poverty and enable the forest dwellers to have improved quality of life with better living conditions and threshold amenities.

Note: this paper is a synthesis of 4 different research projects viz. 1) Assessing the Impact of Micro Finance as A Tool for Adoption of Appropriate Technology and Conserving the Environment, (2003) by Prof. B.P. Pethiya and Mr. Teki Surayya, 2) Sustainable harvesting, Value Addition and Marketing of selected Non-Timber Forest Products A case study of Koraput and Malkangiri Districts, Orisa State, (2002) By Dr. Manish Mishra, Mr. Teki Surayya and Mr. R. Mishra, 3) A study on dependence of forest dwellers upon fuel wood & non-wood forest products for survival and pertinent marketing issues: a case study of North Andhra Coastal Districts, (1999-00) by

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INFLUENCE OF SOCIAL MEDIA ON BUYING BEHAVIOUR AMONG YOUTH IN INDORE, INDIA

Dr. Rajendra Jain Shri Vaishnav Institute of Management, Indore, India, email rajprabha1@hotmail.com
Arnav Chaudhary Shri Vaishnav Institute of Management, Indore, India arnav.mailbox@gmail.com

Abstract

In a short span of time, social media has become one of the most loved mediums for the Indian youths today. Social Media Marketing is the hottest new marketing concept and every business owner wants to know how social media can generate value for their business. People are social by nature and collect or share information that is important to them. Social networking- a place where people can use networks of online friends and group memberships to keep in touch with current friends, reconnect with old friends or create real-life friendships through similar interests or groups and share their social experiences. Social network advertising is a term that is used to describe a form of on line advertising that focuses on social networking sites.

Increasing use of new media and technologies to such an extent like smart phone etc. has given marketers the opportunity to reach consumers in a 24/7 capacity through a variety of mediums. It enhances the chances of messaging being seen. Therefore it is obvious to allure the marketers towards social media. Traditional campaigning approaches are overshadowed not only by rising social media but also due to increasing difficulty to create an outstanding campaign due to very competitive market.

The main objective of paper is to understand the usage pattern of social media among youth in the city of Indore. It also aims at assessing the influence of social media on the consumer buying behaviour. In the exploratory survey primary data has been collected from youth of Indore City with the help of questionnaire and secondary data from various sources

INTRODUCTION

A recent study by Stanford based Gartner Inc, a research based firm, has concluded that social networking sites are used by consumers to express their opinions before and after making a purchase decision. As such sites like Twitter and Facebook have become important tools for shopping. It has been observed that people in the developed

and developing countries having access to the internet have been increasingly using social media for entertainment, socializing and information gathering. The fact that Facebook reported to have 500 million users, and Twitter claiming 145 million registered users during 2010, is testament enough for understanding the reach of this powerful medium. As the number of people using and trusting social media increases, marketers need to step up their communication strategy and come up with creative and innovative solutions in order to create customer value and competitive differentiation. There is a need for marketers to channel their efforts for tapping this innovative and immensely useful and cost effective communication platform. However, marketers need to understand that there are some fundamental differences between the traditional media and social media. Social media is a paradigm shift from mass media like television, radio and, print to an extreme niche i.e. one individual. The

messages on social media thus need to be customized to individuals and this calls for a creative and innovative communication strategy.

LITERATURE REVIEW

Murdough (2009) have positively agreed on the potential of social media but like any other marketing tool it is difficult to gauge the kind of impact that it lays on the masses. According to Winterberg (2010), social media websites like Facebook, LinkedIn, and Twitter come with unbelievable techniques to communicate with family, colleagues and friends. Benson, Filippaios, & Morgan (2010) have studied the usage of social networks in career development of students and also building the relationship with their employers and have concluded on some better understanding of motivations as an effective application of these networks on businesses. Backer (2010) have investigated the usage pattern in adoption of new technologies like Facebook and Smart phones on students and found that such applications create a sense of motivation and responsibility as well as it enriches their learning experiences. Donna and Fodor (2010) have found out that instead of using companies' investment for calculation of returns on investment, managers must assess consumer motivations for using social media and measure customer's investments in calculation of ROI. Sara Tye (2010) have analysed the impact of advances in technology and how it transformed the traditional business procedures in communicating to their target audience. Chan & Prendergast (2007) have perceived Materialism and social comparison as important issues, amongst adolescents and found that Social comparison with friends and with media figures were both positive predictors of materialism.

Kotler, Kartajaya and Setiawan (2009, pp. 55-57), list Facebook, Twitter, EBay, LinkedIn, and Wikipedia, among the list of unusual and successful business ideas in recent times. Ryan and Jones (2009) describe Social Media as "the umbrella term for web-based software and services that allow users to come together online and exchange, discuss, communicate and participate in any form of social interaction. This interaction can encompass text, audio, images, video and other media, individually or in any combination. It can involve the generation of new content; the recommendation of and sharing of existing content; reviewing and rating products, services and brands; discussing the hot topics of the day; pursuing hobbies, interests and passions; sharing experience and expertise – in fact, almost anything that can be distributed and shared through digital channels is fair game."

OBJECTIVE OF STUDY

- 1 To understand the usage pattern of social media among youth in the city of Indore
- 2 To examine the extent to which social media helps consumers in buying decision making
- 3 To assess the influence of social media on the consumer buying behaviour.

RESEARCH METHODOLOGY

The study is based on descriptive research design. A questionnaire has been designed, to know the point of view of respondent regarding the extent of social media that helps consumers in buying decision making.

Data Collection

Primary data was collected through a structured questionnaire that was distributed among youth in city of Indore. The questionnaire contained multiple choice questions as well as it also incorporated various parameters that were identified for analysing the preferences of youngsters towards various social media websites.

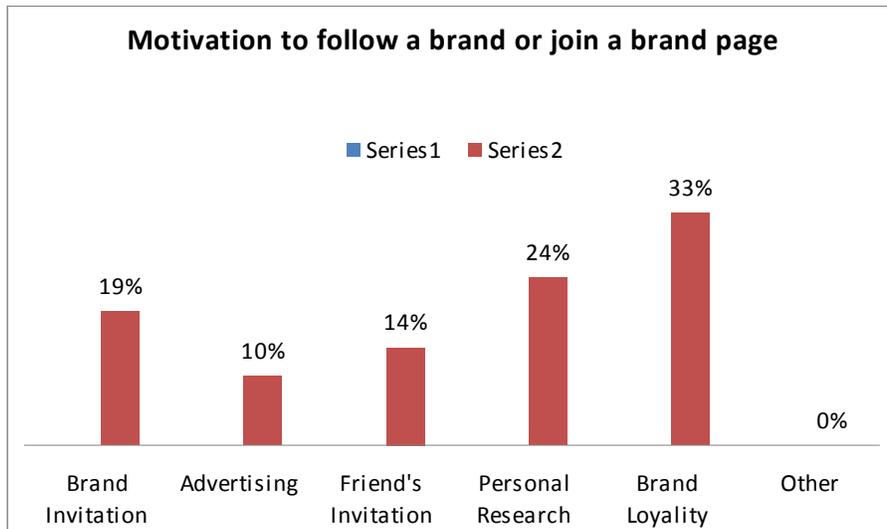
Primary research was done through distribution of structured questionnaires amongst 121 youth in the city of Indore. Convenience sampling technique was used for period of one month.

The research is basically focused on the understanding the usage pattern of youth and their preference towards various social media websites. The data was analysed by using statistical tools.

FINDINGS

Responses received from respondents were from 24 -35 year age group.having 50 % males. From the choice of social media preferred,79% respondents uses Face book and 29% linkdin.No response for Twitter , U tube. and Orkut .

2. Motivation to follow a Brand or Join a Brand page



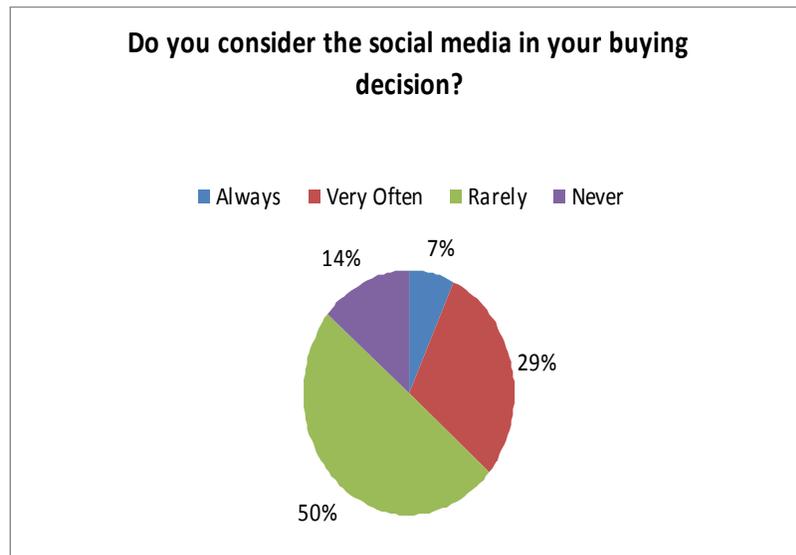
3. Time spent on social networks every day.

less than 1 hour	36%
one to 2 hours	43%
more than 2 hours	7%
more than 3 hours	14%

79 % respondents spend one to two hours on social network every day.

4. Considering Social Media in Buying decision

Always	7%
Very Often	29%
Rarely	50%
Never	14%

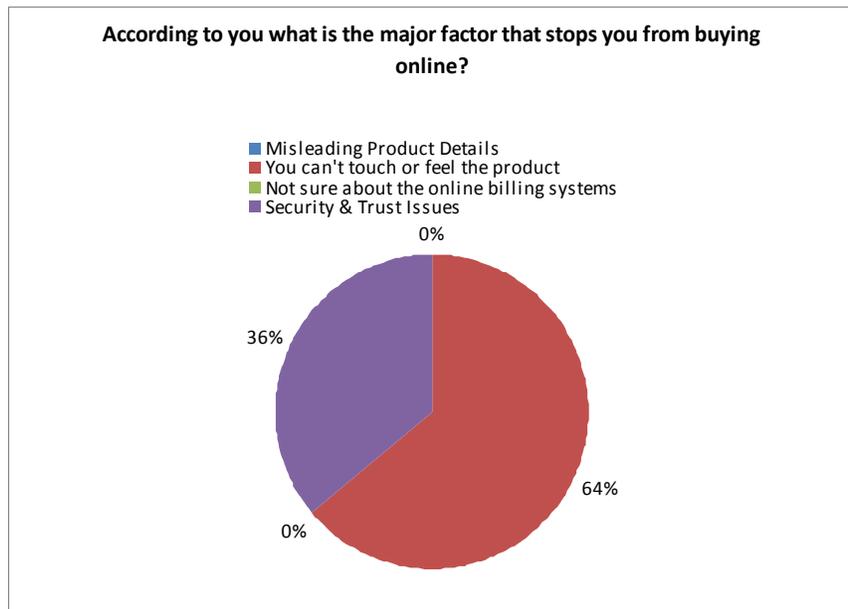


50% respondents always consider social media in their buying decisions, while another 29 % use very often. This shows increasing trend of considering social media in buying decisions.

5. Major factors stopping from buying online

Misleading Product Details	0%
You can't touch or feel the product	64%
Not sure about the online billing systems	0%
Security & Trust Issues	36%

64% feel they can not touch or feel the product. Another 36% consider security & trust issues. Hence the people consider the social media but prefer to buy from other sources.

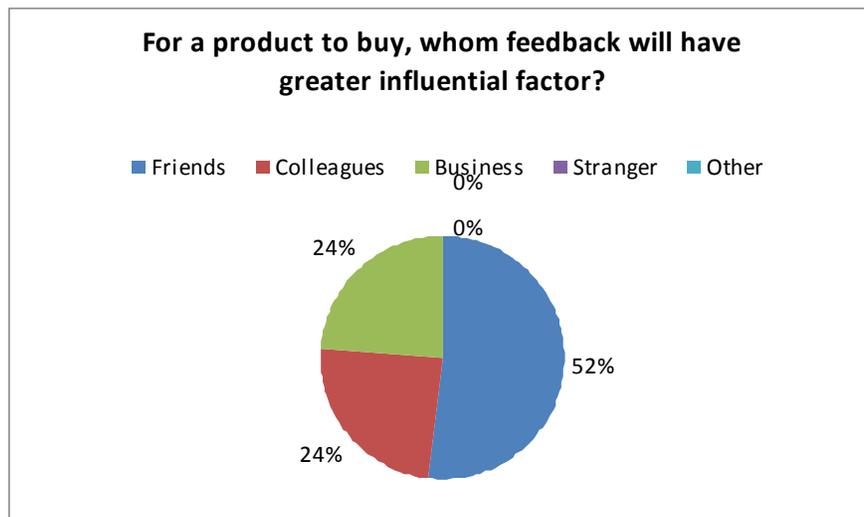


6. Do You Notice the Ads on Social networking sites

Always	7%
More Likely	21%
Likey	64%
Less Likely	7%
Never	0%

7 Feedback as. Influencing factor in Buying decision

Friends	52%
Colleagues	24%
Business	24%
Stranger	0%
Other	0%



8. Social Media messages V/s Traditional media

Strongly Disagree	8%
Disagree	15%
Undecided	31%
Agree	46%
Strongly Agree	0%

CONCLUSIONS

social media is a very important tool for networking among youngsters. Youth are increasingly using these websites to stay connected with their friends and family. These websites also help in building professional contacts and provides the user with various networking applications that makes them hooked on to these social media websites. Unique features of social media websites like Facebook, Twitter etc have created huge impetus on the communication platform. Social media is also used as a marketing tool in creating brand awareness and brand preference among the consumers. Social media is the cheapest medium for seeking information. Hence it is widely used by majority of customers for evaluations of brands and products.

From the study it is concluded that,79% respondents uses Face book and 29% linkdin.No response for Twitter , U tube. and Orkut . 79 % respondents spend one to two hours on social network every day. 50% respondents always consider social media in their buying decisions, while another 29 % use very often. This shows increasing trend of considering social media in buying decisions. 64% feel they can not touch or feel the product. Another 36% consider security & trust issues. Hence the people consider the social media but Colleagues prefer to buy from other sources.64% notice the advertisements on social media but feedback from friends and is important in taking decision. 46 % agree that viral marketing messages are more effective as compared to traditional media like TV. And print ads.

There is an increasing trend among youngsters to refer products online through these websites. Marketers have realized the importance of social media website as an essential component of integrated marketing

communications. Every company aims to have their presence felt on these websites for the sheer reach to the target customers. Companies with their promotional strategies advertise their brands on social media websites so as to influence the brand preference among the youth. It also encourages constant interaction with the customers, gaining an insight on their likes and preferences and problems associated with the product. This helps the companies to take corrective measures in a timely manner and modify their products as per the customer needs. It can be used as a growing platform for launching new products. This ultimately can lead to higher sales and helps in increasing the market share of the product. Further analysis of the paper indicates that the youth have their own set of preferences for different social media websites. It means that youngsters have different expectations and opinions behind joining a particular social networking site.

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STOCHASTIC LOGISTIC MODEL FOR STOCK MARKET VOLATILITY

By

Surender Kumar¹ JRE School of Management, Greater Noida, (U.P.) India, Email:

surender.kumar@jre.edu.in

Pawan Gupta² JRE School of Management, Greater Noida, (U.P.) India, Email: pawan.gupta@jre.edu.in

ABSTRACT

In this paper we have combined theory from population biology with stochastic differential equations. To get precise picture of reality one need to capture stochastic fluctuations in populations using stochastic models. A stochastic logistic differential equation with a time-varying parameter is used to model the growth of stock market. We have considered homogeneous investors population constituting a part or component of system. We have obtained time dependent solution of the stochastic logistic model of stock market with multiplicative fluctuations.

Keywords: Logistic Differential Equation, Time-Varying Parameter, Logistic Model, Multiplicative Fluctuations

Introduction:

A large number of growth models have been discussed in literature and scores of research papers are published on the mathematical and statistical growth models for studying population processes. However, most of these models are confined to either checking the empirical possibility of the data or the estimation of parameters of various models. Generally, the logistic models are extensively applied for the study of the biological systems. In the field of economic enquiry, they have been hardly ever applied to attempts at the analysis of the economic systems [1-3]. There have been applications of the logistic model outside the field of Biology also. Fisher and Fry [4] have successfully exploited the logistic model to describe the market penetration of many new products and technologies. Marchetti and Nakicenovic [5] have given a summary of world energy usage and source substitution by employing the logistic model. Dalia and Stasys [6] recently applied logistic models for stock market bubbles analysis. Herman and Montroll [7] have shown that as basic an evolutionary process as the industrial revolution may also be modelled by logistic dynamics. We have used stochastic logistic model to study the stock market volatility as it is highly complex and needs stochastic analysis for a realistic description and comprehensive understanding of its behavior and evolution.

The Model:

In this model we have assumed homogeneous investors population constituting a part or component of system. In reality investors are heterogeneous; however we have made this assumption as more complicated model becomes mathematically intractable and as main interest lies in the overall gross behavior of the stock market, a simple model may be adequate to provide some insight into. Suppose that we have initially $n(0) = n_0$, value of index that grows to $n(t)$ at any time t . The basic logistic deterministic model for such a growth is described by the Verhulst's equation[8].

$$\frac{d(n(t))}{d(t)} = \nu n(t) \left[1 - \frac{n(t)}{N} \right] \quad (1)$$

Where ' ν ' denotes the intrinsic rate of growth of stock market index due to the self interaction of investors, and N is the carrying capacity of the system. The solution of (1) is

$$n(t) = \left[\frac{n_0 e^{at}}{1 - [n_0(1 - e^{at}) / N]} \right] \quad (2)$$

The linear stability analysis shows that the fixed points of the system are $n=0$ and $n=N$; the former is unstable and the latter is asymptotically stable.

Stochastic Formulation:

Stochastic versions of logistic models have been discussed in literature on population processes and in ecology [9-11] and only steady-state studies have been made. In this problem, we shall first obtain a time dependent solution of stochastic version of the logistic model for stock market growth with multiplicative fluctuations. The stochastic differential equation corresponding to equation (1) is

$$\frac{d(n(t))}{d(t)} = v_1 n(t) \left[1 - \frac{n(t)}{N} \right] + \sigma n(t) W(t) \tag{3.1}$$

With initial condition

$$n(0) = n_0, \tag{3.2}$$

where σ is positive constant and $W(t)$ is standard white noise with zero mean and unit intensity. For the sake of clarity and brevity, we shall rewrite (3.1) as

$$\frac{d(n(t))}{d(t)} = [v_1 - v_2 n(t) + \sigma W(t)] n(t) \tag{4.1} \text{ Where } v_2 = v_1 / N \tag{4.2}$$

On setting $X=1/n$ (5)

the non-linear equation (4.1) reduces to the linear equation

$$\frac{dx}{dt} = v_2 - v_1 x - \sigma x W(t) \tag{6.1} \text{ with initial condition } x(0) = \frac{1}{n_0} = x_0 \tag{6.2}$$

Using the representation of the white noise, we obtain the drift and diffusion coefficients $D_1(x)$ and $D_2(x)$ of the process $x(t)$:

$$D_1(x) = v_2 - v_1 x + \frac{1}{2} \sigma^2 x, \tag{7.1} \quad D_2(x) = \sigma^2 x^2. \tag{7.2}$$

The corresponding probability density function $p(x | X_0, t)$ with an initial value $\delta(x - x_0)$ satisfies the Fokker-Planck Equation

$$\frac{\partial p}{\partial t} = - \frac{\partial}{\partial x} [\{ v_2 - (v_1 - \frac{\sigma^2}{2}) x \} p] + \frac{\sigma^2}{2} \frac{\partial^2}{\partial x^2} (x^2 p). \tag{8}$$

Next if we transform (x, t) to a new set of variables (y, T) such that

$$y = \frac{\sigma^2}{2\kappa} x, \quad T = \frac{\sigma^2}{2} t, \tag{9}$$

Then $p(x, t)$ transforms to new probability density function $\left(\frac{\sigma^4}{4v_2} \right) q(y, T)$. Now ignoring the jacobian $\left(\frac{\sigma^4}{4v_2} \right)$,

which will appear throughout, we find

$$\frac{\partial p}{\partial t} \rightarrow \frac{\partial T}{\partial t} \frac{\partial q}{\partial T} = \frac{\sigma^2}{2} \frac{\partial q}{\partial T}, \tag{10.1}$$

$$\begin{aligned} \frac{\partial}{\partial x} [\{ v_2 - (v_1 - \frac{\sigma^2}{2}) x \} p] &\rightarrow \frac{\partial y}{\partial x} \frac{\partial}{\partial y} [\{ v_2 - (v_1 - \frac{\sigma^2}{2}) \frac{2\kappa}{\sigma^2} y \} q] \\ &= \frac{\sigma^2}{2} \frac{\partial}{\partial y} [\{ 1 - (2v_1 / \sigma^2 - 1) y \} q], \end{aligned} \tag{10.2}$$

$$\frac{\partial^2}{\partial x^2} (x^2 p) \rightarrow \left(\frac{\partial y}{\partial x} \right)^2 \frac{\partial^2}{\partial y^2} \left[\left(\frac{2v_2 y}{\sigma} \right)^2 q \right] = \frac{\partial^2}{\partial y^2} (y^2 q) \tag{10.3}$$

Therefore, on substituting (10.1) to (10.2) into (8), we obtain

$$\frac{\partial q}{\partial T} = -\frac{\partial}{\partial y}[\{1 - (2\alpha - 1)y\}q] + \frac{\partial^2}{\partial y^2}(y^2q), \tag{11.1}$$

where $\alpha = \frac{V_1}{\sigma^2}$. (11.2)

For the sake of compactness, we shall rewrite (11.1) as

$$\frac{\partial q}{\partial T} = -\frac{\partial}{\partial y}[C_1(y)q] + \frac{\partial^2}{\partial y^2}[C_2(y)q], \tag{12.1}$$

where

$$C_1(y) = 1 - (2\alpha - 1)y, \tag{12.2} \quad C_2(y) = y^2 \tag{12.3}$$

or $\frac{\partial q}{\partial T} = -\frac{\partial}{\partial y}[J(y, T)]$. (13)

In this setting, following Wang and Uhlenbeck [12], the function $C_2(y)$ can be repeated as variance of $y(T)$, and equation (13) can be considered as continuity equation for the probability density, and

$$J(y, T) = \frac{\partial}{\partial y}(C_2q) - C_1q, \tag{14}$$

as the probability flux.

Further, following Feller [13] we consider the boundaries $y_1 = 0$ and $y_2 = \infty$ as reflecting barriers and we thus have $J(y, T)|_{y=y_1, y_2} = 0$. (15)

Equation (13) with boundary conditions (15), can be solved either method of separation of variables. In this method partial differential (13) is transferred in to two ordinary differential equations of order one and order two. The method of separation of variables involves the concept of self-adjoint operator and an eigenvalue problem.

Self-Adjoint Differential Operator:

Consider a second order linear differential operator L on a function $u(x)$ defined by

$$Lu(x) = [p_0(x)\frac{d^2}{dx^2} + p_1(x)\frac{d}{dx} + p_2(x)]u(x), \tag{16}$$

Where $p_i(x), i = 0, 1, 2$ are real valued functions of x over an close interval $[a, b]$ such that first two i derivatives of $p_i(x)$ are continuous and $p_0(x)$ does not vanish in the open interval (a, b) . We define adjoint operator \bar{L} of L by

$$\begin{aligned} \bar{L}u(x) &= \frac{d^2}{dx^2}[p_0(x)u(x)] + \frac{d}{dx}[p_1(x)u(x)] + p_2(x)u(x) \\ &= [p_0(x)\frac{d^2}{dx^2} + \{2p_0'(x) - p_1(x)\}\frac{d}{dx} + p_0''(x) - p_1'(x) + p_2(x)]u(x), \end{aligned} \tag{17}$$

where primes denotes the derivatives of coefficients with respect to x .

The necessary and sufficient condition that $L = \bar{L}$ is that

$$p_0'(x) = p_1(x). \tag{18}$$

When this condition is satisfied, we have

$$Lu = \bar{L}u = \frac{d}{dx}[p_0(x)\frac{du(x)}{dx}] + p_2(x)u(x), \tag{19}$$

and the operator L is said to be ‘self-adjoint’ or ‘Hermitian’. Any way if $p_0(x)$ does not vanish in the open interval (a, b) , then a second order linear differential operator E as given in (16) can always be transformed in to the required self-adjoint operator from (19). We can write (19) in the standard form

$$Lu = \bar{L}u = \frac{d}{dx} \left[p(x) \frac{du(x)}{dx} \right] + p(x) u(x), \tag{20}$$

With the condition that $p(x)$ does not vanish in the open interval (a, b) .

Eigen value Problem:

To a self-adjoint operator as given by (20), we associate the so called eigen value problem as follows. Consider the differential equation

$$u(x) + \lambda W(x) u(x) = 0, \tag{21}$$

Where λ is a constant and $W(x)$ is a known function of x with $W(x) > 0$ except, possibly, at isolated points at which $W(x) = 0$. For a given choice of parameter λ , a function $u_\lambda(x)$ which satisfies the differential equation (21) and the imposed boundary condition of the problem is called an ‘eigenfunction’ corresponding to λ . The constant λ is called an ‘eigenvalue’. $W(x)$ is called the density or weighting function of the eigenvalue problem. The remarkable properties of self-adjoint operator are:

- i. Its eigenvalues are real,
- ii. Its eigenfunctions are orthogonal,
- iii. Its spectrum is discrete if a and b are finite, and continuous when one or both boundaries are infinite.

Solution to the Problem:

We split up probability density function $q(y, T)$ in such a way that partial differential equation (12.1) transformed into two ordinary differential equations. Keeping in view that limiting distribution $q(y, \infty)$ should result into steady state distribution, say $W(y)$, we set

$$q(y, T) = \psi(T)W(y)\phi(y) = \psi W\phi, \tag{22}$$

Where ψ depends on T and W and ϕ depend on y only. Substituting (22) in to (12.1), we get

$$\begin{aligned} W\phi \frac{\partial \psi}{\partial T} &= \psi \frac{d}{dy} \left[\frac{d}{dy} (C_2 W\phi) - C_1 W\phi \right] \\ &= \psi \frac{d\phi}{dy} \left[\frac{d(C_2 W)}{dy} - C_1 W \right] + \psi\phi \frac{d}{dy} \left[\frac{d(C_2 W)}{dy} - C_1 W \right] + \psi \frac{d}{dy} \left[(C_2 W) \frac{d\phi}{dy} \right]. \end{aligned} \tag{23}$$

Since we have assumed $W(y)$ to be steady-state distribution, we have

$$\frac{d(C_2 W)}{dy} - C_1 W = 0, \tag{24}$$

and therefore (23) reduces to $W\phi \frac{\partial \psi}{\partial T} = \psi \frac{d}{dy} \left[C_2 W \frac{d\phi}{dy} \right]$, or $\frac{1}{T} \frac{\partial \psi}{\partial T} = \frac{1}{W\phi} \frac{d}{dy} \left[C_2 W \frac{d\phi}{dy} \right]$. (25)

In equation (25), the left hand side is a function of T alone, where a right hand side depends only on y . So equation (25) is a sort of paradox in the sense that, a function of T is equated to a function of y , but y and T are independent variables. This independence means that behavior of T as an independent variable is not determined by y . The paradox is resolved by setting each side equal to λ a constant of separation. With setting (25) leads to

$$\frac{d\psi}{dT} + \lambda\psi = 0, \tag{26} \text{ And } \frac{d}{dy} \left[(C_2 W) \frac{d\phi}{dy} \right] + \lambda W\phi = 0. \tag{27}$$

Now we have two ordinary differential equations (26) and (27) to replace equation (12.1). we have observed that (27) represents an eigenvalue problem. The boundary condition (15) imply

$$\psi(T) \left[\frac{d}{dy} (C_2 W \phi) - C_1 W \phi \right]_{y=y_1, y_2} = 0 \quad \text{or} \quad \left[C_2 W \frac{d\phi}{dy} - \phi \frac{d(C_2 W)}{dy} - C_1 W \right]_{y=y_1, y_2} = 0. \quad (28)$$

Using (24) in (28), we get the required boundary conditions

$$\left[C_2 W \frac{d\phi}{dy} \right]_{y=y_1, y_2} = 0. \quad (29)$$

Determination of the First Order Probability Density Function W(y):

Since $0 \leq y \leq \infty$, the direct integration of equation (24) yields

$$W(y) = C^* \exp \left[\int_0^y \left\{ (C_1(u) - \frac{dC_2(u)}{du}) / C_2(u) \right\} du \right] = C^* y^{-(1+2\alpha)} e^{-\frac{1}{y}}, \quad (30)$$

where C^* is a constant of integration. Next applying the normalization condition, we obtain

$$C^* \int_0^\infty e^{-\frac{1}{y}} y^{-(1+2\alpha)} dy = 1, \text{ which on substitution, } y = \frac{1}{z} \text{ gives } C^* \int_0^\infty e^{-z} z^{2\alpha-1} dz = 1,$$

Whence $C^* = \frac{1}{\Gamma(2\alpha)}$, (31) and $W(y) = \frac{1}{\Gamma(2\alpha)} y^{-(1+2\alpha)} e^{-\frac{1}{y}}$. (32)

We can easily show that, treating n as a continuous variable, its steady-state probability density function $W(n)$ will be given by

$$W(n) = \frac{(2\nu_2 / \sigma^2)^{2\alpha}}{\Gamma(2\alpha)} n^{2\alpha-1} e^{-(2n\nu_2 / \sigma^2)}. \quad (33)$$

with an appropriate identification of parameter, (33) turns out to be an Erlang distribution and, thus I the steady state the mean and variance of the process can be directly evaluated. Thus, on setting $\nu_2 / \sigma^2 = \alpha\mu$ and $2\alpha = k$, then (33) becomes

$$W(n) = \frac{(\mu k)^k n^{k-1}}{\Gamma(k)} e^{-\mu kn}, \quad (34)$$

Therefore $E(W(n)) = \frac{1}{\mu} = \frac{\alpha\sigma^2}{\nu_2} = \frac{\nu_1}{\nu_2}$, (35) and $Var(W(n)) = \frac{1}{k\mu^2} = \frac{\alpha(\sigma^2 / \nu_2)^2}{2} = \frac{\nu_1\sigma^2}{2(\nu_2)^2}$. (36)

Determination of the Time-Dependent Solution:

On substituting the value of $W(y)$ from the equation (32) in to the eigenvalue problem (27), we get

$$\frac{d}{dy} \left[y^{(1-2\alpha)} e^{-\frac{1}{y}} \frac{d\phi}{dy} \right] + \lambda y^{-(1+2\alpha)} e^{-\frac{1}{y}} \phi = 0, \text{ or } y^2 \frac{d^2\phi}{dy^2} + [1 - (2\alpha - 1)] \frac{d\phi}{dy} + \lambda \phi = 0. \quad (37)$$

The differential equation (37) is solvable in the following two cases

i) $\lambda = m(2\alpha - m)$, where $0 \leq m \leq M$ and $(\alpha - 1) \leq M \leq \alpha$, (38.1)

ii) $\lambda = \alpha^2 + \beta^2$, $\beta \geq 0$. (38.2)

Case (i)

Substituting the value of λ from (38,1) into (37) and (26) and denoting λ dependent solution by ϕ_m and ψ_m , we get

$$\phi_m = (-1)^m y^{(1+2\alpha)} e^{\frac{1}{y}} \frac{d^m}{dy^m} [y^{2m-2\alpha-1} e^{-\frac{1}{y}}], \quad (39.1) \quad \psi_m = \exp[-m(2\alpha - m)T], \quad (39.2)$$

$$\text{and accordingly } q_M(y, T) = \sum_{m=0}^M \kappa_m W(y) \phi_m \psi_m, \quad (40)$$

where κ_m are constants and can be determined by using the orthogonality condition on the function $\phi_m(y)$ with weighting function $W(y)$ as

$$\int_0^\infty W(y) \phi_{m_1}(y) \phi_{m_2}(y) dy = \delta_{m_1, m_2}. \quad (41)$$

Substituting the allowed continuous value of λ from (38.1) into (37) and (26) and denoting λ dependent solution by $\phi(\beta, y)$ and $\psi(\beta, T)$, we get $\phi(\beta, y) = {}_2F_0(-\alpha - i\beta, -\alpha + i\beta, -y)$, (42.1)

$$\text{And } \psi(\beta, T) = e^{-(\alpha^2 + \beta^2)T}, \quad (42.2)$$

Where ${}_2F_0$ is Generalized Hypergeometric Series [14], Since the normalizing condition for the eigenfunctions $\phi(\beta, y)$ corresponding to continuous eigenvalue λ is

$$\int_0^\infty W(y) \phi(\beta, y) \phi(\beta', y) dy = \delta(\beta - \beta'), \quad (43)$$

therefore, on combining the solutions (40), (42.1) and (42.1), we obtain

$$q(y, T) = y^{-(1+2\alpha)} e^{\frac{1}{y}} \left\{ \sum_{m=0}^M \frac{2(\alpha - m)}{\Gamma(1 + 2\alpha - m)} \frac{1}{m!} e^{-m(2\alpha - m)T} \phi_m(0) \phi_m(y) + \frac{1}{2\pi} \int_0^\infty e^{-(\alpha^2 + \beta^2)T} C_1(\beta) \phi(\beta, 0) \phi(\beta, y) d\beta \right\} \quad (44)$$

$$\text{where } C(\beta) = \frac{\Gamma(-\alpha + i\beta) \Gamma(-\alpha - i\beta)}{\Gamma(i\beta) \Gamma(-i\beta)}. \quad (45)$$

is a normalization factor. The time dependent probability density function $p(n, t)$ for the stock market growth can be retrieved from equation (44)

Conclusion:

In this analysis we found that expected value of growth process for a steady-state distribution given by (35) is precisely the same as the asymptotic value $n(\infty)$ obtained from the deterministic equation (2). However deterministic theory cannot move beyond this and cannot predict overall behavior of the stock market growth due to stochasticity in the process. In this investigation we look forward to shrink the gap between the experimental results and predicted by the deterministic modeling.

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EVOLUTION OF GREEN ICT IMPLEMENTATION AT EDUCATION INSTITUTIONS: STUDY WITH REFERENCE TO MAHARASHTRA

Dr. Sameer Narkhede, School of Management Studies, North Maharashtra University, Jalgaon (M.S.) INDIA
(spn13371@gmail.com)

Kavita Suryawanshi, Dr. D.Y.Patil Institute of MCA, University of Pune, Pune (M.S.) INDIA
(kavital104@yahoo.com)

ABSTRACT

Green ICT is ICT related to the environment protection and preservation & creating green environment. The Maharashtra is one of the states in India to focus on the environmental sustainability. The Maharashtra public sector including educational institutions and private sector including IT/BPO industry is implementing Green or eco sustainable ICT. The paper analyzes the need of green ICT practices at education institution. The study presents the benefits to educational institutes for going green information and communication technology based on data collected from survey of various websites of educational institutions and interviews of selected directors/deans from various institutions.

Keywords—Information and Communication Technology (ICT), Green ICT, Education Institutions, Green ICT Practices.

INTRODUCTION

The growing boom of ICTs in India today is also simultaneously witnessing a growing impact on the environment and climate change. All professional institutes need to satisfy AICTE norms; Number of PCs to Student ratio should be 1:2 i.e. 30 PCs, Legal System Software 03, Legal Application Software 20, All PCs should be in LAN, Mail server and client, Minimum 02 internet connections of 2 MBPS and 10 % of printers in laboratory i.e. 03; as well as need to apply for National Board of Accreditation in Maharashtra when establishing new course or running existing course. The institutions where computer and IT related courses are conducted are considered as a professional Institute with yearly intake of 60 students for (Master of Computer Applications) MCA Course. According to AICTE norms each Institute requires a Computer Lab of 30 Computers with latest configuration. These computers become outdated after three years because at that time “Latest Configuration” will be different (AICTE manual) .So that most of the institutes attempt to write-off these computers which lead generation of e-waste. Maharashtra ranks first in India which generates more than 60% of the total e-waste generated from use of ICT in India [2].

Currently biggest challenge facing the environment is global warming caused by carbon emission. It is very much necessary to save the environment and ultimately the earth .Use of ICT in education is a cause of carbon dioxide emission, high energy consumption and hazardous waste production. These pressure led education institutions to adopt Green ICT so as to minimize energy consumption, carbon footprint, ICT waste and to maximize recycling & reuse and to reduce energy cost. Moreover savings can be achieved by minimizing the wastage of computational facility. With the increase in the number of institutions offering professional education, green ICT implementation at institutions has become key ingredient to achieve cost effective solutions and corporate social responsibility. The universities and colleges has to adopt more sustainable approaches to ICT use .The pressure should be enforced from Maharashtra government, from external stakeholders and the public who are increasingly aware of the environmental and energy cost.

Based on these observations, following questions arise:

- What are the current Green ICT practices followed by educational institutions?
- What are the benefits of Green ICT implementation to educational institutions?

This paper reviews the literature available on Green ICT. The structure of paper is as follows. Initially, the Researchers reviewed Maharashtra government’s Green IT policy and Green ICT concepts. Secondly the Researchers have presented the green ICT practices to be followed by educational institution. A discussion on the analysis of benefits of green ICT implementation to education institutions is followed by a conclusion.

BACKGROUND

India possesses a highly developed higher education system. In its size and diversity, India has the third largest higher education system in the world, next only to China and United States (MHRD Annual Report). US

Energy Information Administration publishes international energy statistics reveals that India is now the world's third biggest emitter of Co₂ (carbon dioxide) [4]. In general, the carbon footprint of the ICT can be measured in terms of electricity usage, paper and printing costs, equipment recycling and disposal costs.

Maharashtra Government Policy

The state of Maharashtra has emerged as a key hub for ICT, electronics, and in the captive business outsourcing industries. Maharashtra is the largest market for IT hardware and internet in India. IT continues to transform daily life for the better. It has become necessary to address the environmental consequences of the rapid increase in IT users. Maharashtra IT/ITES Policy-2009 will be valid up to 14th August, 2014. The Policy proposes path breaking initiatives to promote 'green' IT and electronic hardware, as well as e-waste recycling (MH IT/ITES policy 2009).

Maharashtra government promotions of 'Green IT' are as follows:

- 1) Awards will be instituted for demonstrating, efficient natural resource management by IT units.
- 2) The development of comprehensive e-waste collection and recycling systems and its use by State as well as private agencies for the disposal of IT products, will be promoted.
- 3) While procuring IT products, Government will give preference to firms that have an expressed end-of-life product take-back policy and e-waste recycling processes.
- 4) Government Departments and agencies would give preference to 'green' and energy- efficient IT products in their procurement.

Green ICT

Advances in Information and Communication Technology (ICT) over the past few years shown an exponential growth in technology and its global presence. Hence, there is need for solutions to optimize energy consumption in the ICT sector. Such solutions are collectively referred to as Green ICT (vineetha paruchuri, 2009).

Keiichi Nakata extends the existing definitions of Green ICT, as a coordination and convergence of strategy, practice and measurement of Green ICT which addresses environmentally sustainability. Green ICT aims to minimize carbon footprint, minimize hazardous ICT waste, reduce energy cost, achieve corporate social responsibility (CSR), and finally comply with regulations (Supaporn Chai, 2011).

Green or eco-sustainability is the ability of one or more entities, either individually or collectively, to exist and thrive (either unchanged or in evolved forms) for lengthy time frames, in such manner that the existence and flourishing of other collectivities of entities is permitted at related levels and in related systems (Molla A., Vanessa C,2008).

This study summarizes and extends the existing definitions as follow. Green ICT consists of policies and practices that deal with environmental sustainability and achieve corporate social responsibility by minimizing carbon footprint, hazardous ICT waste and by optimizing energy consumption and natural resources.

GREEN ICT AT EDUCATIONAL INSTITUTIONS

There is expanding pressure on schools and universities to embrace more economical methodologies to ICT utilization. This force need to originate from government, from outer stakeholders and general society who are eager to get degrees at the natural expense. As of late greatest challenge confronting nature's domain is a global warming via carbon emission. It is truly essential to recover nature and at last the earth .Use of ICT in education is an explanation for carbon dioxide emission, high energy utilization and unsafe waste generation.

These pressures made educational organizations to embrace Green ICT in order to minimize energy utilization, carbon footprint, ICT waste, to boost recycling & reuse and to diminish energy cost, besides environment could be realize by minimizing the wastage of computational facility. With the increment in the amount of education institutions offering professional education, green ICT usage at establishments has come to be key part to attain cost effective solutions.

All educational institutes need to fulfill AICTE standards and also need to apply NBA (National Board of Accreditations) in India while introducing new course or running existing course. For running MCA course, with an intake of 60 students, according to AICTE norms, the institute must possess at least 30 computers. After every three years they become outdated as latest configuration arrives in the market.

Green ICT has a part of advancement in administering ICT recognized with the sustainability, Researchers intends to focus why education institutions need to give careful consideration to green ICT by inspecting three sorts of demands : environmental, social and economic.

1. Green ICT and Environmental Demands

For the most part, Green ICT issues are spoken in natural terms because of the effect of ICT on nature's domain. ICT results into carbon dioxide emanations, high energy utilization, creation of hazardous e-waste, which is dangerous for people and the earth. Concerning higher education systems, the learners and staff have expanded the amount of ICT utilized as a part of their regular life. Appropriately, these forces dependent upon these evaluations regulate education institutions to adopt Green ICT in order to minimize energy utilization, carbon footprint, ICT waste, and to expand reusing, refurbishing and reuse. Every living person may as well come to be Green ICT pioneer for social change and saving mankinds from natural contamination.

2. Green ICT and Social Demands

ICT has social effects which are both granted and unconvinced. Regardless of the possibility that Green ICT is ordinarily approached scientific, technical and environmental points of view, a thought of social challenge ought to be tended to as far as education institute. Green ICT works to attain social viewpoints which are identified with Corporate Social Responsibility. Therefore Green ICT helps education organizations to realize social profits like enhanced image, higher reputation and trustworthiness.

3. Green ICT and Economic Demands

ICT has straight influenced cost related expense incorporating utilities and support & operation cost, which build each year. The energy utilization of India ICT infrastructure is estimated to expand by 30% to in excess of 31 trillion-watt hours by 2014, an investigation of Global research firm Gartner. Green ICT proposes to utilize energy effective supplies and diminish energy cost. In that capacity, Green ICT in education institutions can additionally address budgetary requests through expense adequacy and best asset use.

ANALYSIS AND DISCUSSION

The responses from interviews of selected directors/deans from various institutions were analyzed. The analysis of Green ICT practices and benefits are discussed in this section are based on the data collected from survey of various websites of educational institutions and interviews of selected directors/deans from various institutions.

Green ICT Practices

With the increasing awareness of environmental issues around the world, institutions are turning to green ICT initiatives more and more. Not only are there significant environmental benefits to these initiatives, but they can also yield substantial business benefits. Green ICT also encourages and supports Greener behavior by the faculties, staff members, students and admin people. By various means, including awareness campaigns and ongoing education, and in some cases legislation, the whole culture of education institutions can be changed. Riaz, M.T., Gutierrez, J.M., Pedersen J.M. (2009) have provided a survey of the challenges faced today of global warming by CO2 emission related in global ICT infrastructure. In their paper (2009) they have provided a number of strategies for greening ICT lead by discussion and overall analysis.

Finally, by implementing a Green ICT, education institutions can ensure the sustainability of the IT resources. The researchers have investigated the ways in which educational institutes can reduce, reuse and recycle infrastructure. See Table 1 for a record of the green ICT practices to be followed by education institutions to achieve cost effective solution.

Table 1: Green ICT Practices for Education Institutions

No.	Green ICT Practices	Green Reasoning
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1	IT Equipment Recycling	Reduces carbon footprint through proper disposal of hardware and its hazardous components.
2	Printer Consolidation & Reduction	Reduces the consumption of paper, ink, toner, energy, and hazardous material from printer devices and cartridges.
3	End-User Device Power Management (PCs, monitors)	Reduces the consumption of energy during extended idle times, overnights, etc. And PC Power Management was monitored.
4	Telecommuting Capabilities & Strategies	Reduces carbon emissions from employee commuting activities.
5	Green ICT Committee Formation	Responsible for sustainable ICT practices and motivates all stakeholders to go green in their approach.
6	Use of Thin Client Model was established	Reduces energy consumption and hardware footprint.
7	IT Energy Measurement Tools & Techniques	Reduces future energy consumption by setting baselines, understanding organizational energy use, working towards reduction and improvement. Energy Star /EPEAT Rating hardware were purchased
8	Use of Renewable energy Sources was planned for ICT	Uses renewable energy sources like solar for ICT.

Benefits of GICT to Education Institution

The main motivation for implementing Green ICT is to reduce costs. Actions to minimize the environmental impacts of ICT use can help the education institutions in some of the benefits appealing to all stake holder groups: faculty, student and staff satisfaction increases, the institute image improves in the society. Some of the benefits which are mentioned below:

1) Reduce energy cost

GICT study is beneficial for reduction in environmental impact and power bill which is very essential for future sustainability. By following simple methods of reducing power consumption like Power-down the CPU and all peripherals during the periods of inactivity and so on, each institution can reduce energy cost and ultimately contribute towards sustainable earth.

2) Minimize carbon footprint, hazardous ICT waste:

The ICT generates large amount of hazardous waste. Hazardous ICT waste not only has impacts on people's health but also consumes space in a landfill .Examples of reducing ICT wastes are recyclable or reusable equipment which can extend the ICT lifecycle equipment. Therefore, institutions need to minimize hazardous ICT waste, which is one of the objectives of Green ICT. GICT study is beneficial for reduction in environmental impact and cost saving which is very essential for future sustainability.

3) Comply with regulation

The institute can comply with the environmental laws, protocols for sustainability by way of reducing e-waste, providing healthy environment, minimizing power bill. Being environment friendly is good for the overall geo-economic condition. There is no negative effect of adopting Green ICT practices, therefore no regrets. It saves the resource of the country as a whole. It is now high time people should start saving fuel sources and energy for the future generations along with saving money and assets for them.

4) Sustenance of ICT

The Government sets targets for carbon emissions and other environmental impacts which require strict regulations. Institutions should comply with the regulatory standards for ICT procurement, procedures, ICT waste, ICT-related aspects of buildings, etc. Green ICT implementation will ensure that Natural resources are conserved and are available for our next generation to continue a way of life that is environment friendly.

CONCLUSION

This paper examined Green ICT concepts and has provided the explanation why educational institutions need to give careful consideration to Green ICT and also reviewed Maharashtra government Green IT policy. This paper has also discussed the green ICT practices to be followed by educational institution. Regardless of the practices, the factors that most significantly determine the success of green ICT would be motivation and rationale for adoption of GICT, urgency to comply with environmental laws and policies, support from top management and stakeholder.

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INDIAN HEALTH INSURANCE SECTOR: FACTORS RESPONSIBLE FOR GROWTH

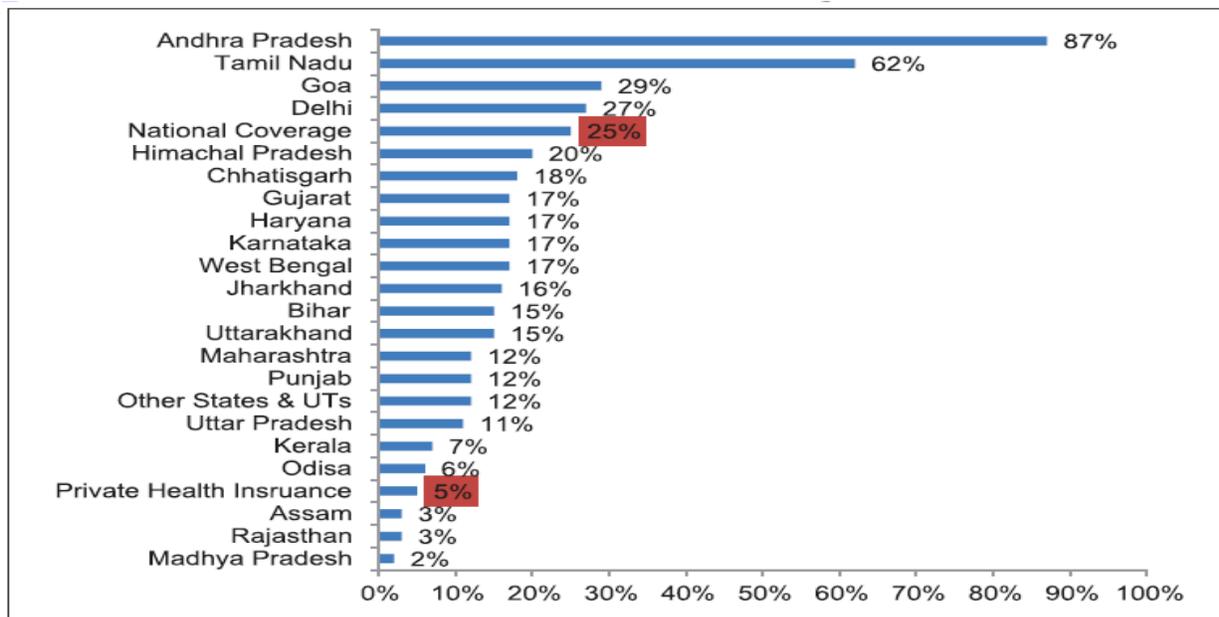
Manish Joshi, Prestige Institute of Management and Research, India, manishjoshi@aol.in
 Dr. Navindra Kumar Totla, Institute of Management Studies, India, navindratotla@gmail.com

INTRODUCTION

The insurance sector in India has grown at faster rate after liberalization. Total premium grew at a CAGR of 25% and reached total of \$67 billion, yet, Indian Insurance penetration, measured as ratio of premium underwritten to GDP was only at 5.2 % in 2010, significantly lower than Asian peers, like South Korea, Taiwan, Japan and Hong Kong which boast an insurance density greater than 10%; growth potential remains promising (<http://www.insurancetech.com>).

PRESENT POSITION

There are between 800 and 900 million people in India who do not have any medical cover; expenditure on medical treatment is one of the constraints in poverty alleviation, expansion of universal health insurance can be a good intervention. The coverage of health insurance continues to be very low and only around 25% population receives any kind of health insurance (Choudhari, 2013). National and state wise health insurance coverage in 2010 was as follows:



Source: Choudhary, 2013.

CHALLENGES

Insurance awareness is lower especially in health insurance. The perceived value of buying insurance products remains low due to high expectations on returns to which other financial products normally offer and the belief that risk coverage is not needed. It makes insurance a push product rather than a pull product in India (IRDA Annual Report, 2010). To attract customers, the insurance companies in non-life insurance have to offer post de-tariffing as premium discounting impacting the profitability and quality of the risks underwritten. Reaching out to the potential willing buyers and servicing them becomes challenge due to the scattered and spread population, especially outside the metros and Tier-I cities. The insurance industry faces challenges in acquiring and retaining internal and external channel teams considering the huge gap between the demand and supply of dependable and

skilled personnel, resulting into high cost of customer acquisition and operations. Non-health coverage, low coverage, discontinuance and lesser payout are challenges.

RATIONALE

Despite the unexplored potential, insurance companies will continue to be confronted by different challenges to achieve top-line and even in bottom-line performances. Apart from struggling to maintain growth, insurance companies are called upon to meet the ever increasing dynamic needs of price and service conscious insurance consumers, meet regulatory demands, enhance risk management capabilities, re-evaluate business partnerships and joint ventures, adopt new distribution models and build capabilities in more enabling but technology driven environment. Due to the challenges and threats, accessing the next phase of growth requires identification and better understanding of different factors and strategies responsible for its growth.

LITERATURE REVIEW

There are few explorative factors (STEEPLA) that are believed to impact on the growth of health insurance industry.

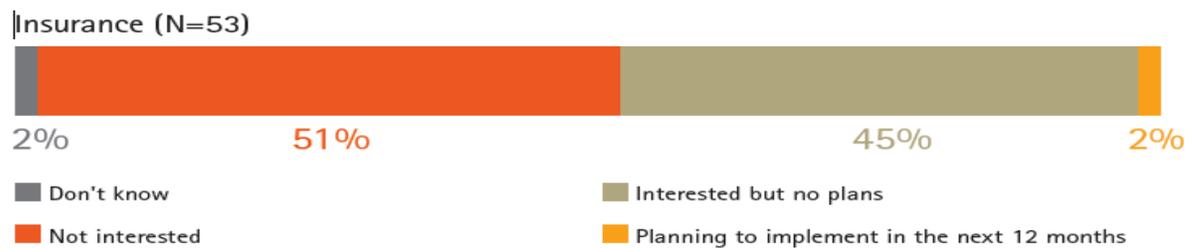
SOCIAL

Power balance is shifting from companies towards customers causing favorable growth of health insurance. How health financing systems can provide sufficient financial risk protection to entire population against costs of healthcare, is a question of paramount importance towards society risk pooling. The level of income, structure of economy, distribution of population, country's ability to administer social health insurance, and level of solidarity within society are few identified factors (<http://www.who.int>) including race. Education level, family and social support, and community safety are components of determinants of health. The other social indicators are: poverty, housing burden, legal and social equity, community cohesiveness, safety, civic engagement, and economic hardship.

The indicators of Economic Hardship Index are: crowded housing, percent of persons living below the federal poverty level, percent of persons over the age of 16 years who are unemployed, percent of persons over the age of 25 years without a high-school education, dependency and per capita income (<http://www.publichealth.lacounty.gov>). Socially disadvantaged individuals are prone to higher rates of disability, disease, and mortality. Individuals with higher education and income live longer, have lower rates of disease and disability regardless of income and health insurance. Low-income older adults are more likely to have unmet care needs (<http://www.hennepin.us>).

TECHNOLOGICAL

Health insurance companies consider technology as an enabler tool to respond challenges and opportunities. The business and IT agenda become interchangeable technology becomes a driving force for health insurers interacting with customers having new expectations like to be able to manage transactions how, when and where they want (<http://www.insurancetech.com>). Advances in software and hardware transform big and large data into actionable insights. As the insurance industry reaps productivity gains from wave of automation, new technologies are significantly enhancing operational efficiencies, revenue opportunities, and improving customer experience through growth in smart phones and tablets; cloud computing, constant access to internet, exploded increase of computing power and storage, enabling accumulation and analysis of large data and growth in active sensors and devices connected through internet (CISCO, 2011). Technology makes health insurance service-centric rather than server-centric architecture to create flexible, responsive and agile business models and capabilities. Analysts rated technology at 91 percent as either critical or important; current technology performance as poor and advised major improvement (<http://www.accenture.com>). Cloud computing has yet to make greater impact in insurance as many insurers are saddled with rigid and costly legacy systems that cannot be easily moved into more agile and responsive, commercial systems, business processes. Cloud Investment Intentions among Insurers is illustrated below:



(Source: Enterprise and SMB Hardware Survey, 2009).

By 2020, different biotechnologies will be available at nano-scale, providing ability to embed devices and sensors unobtrusively within human body. Nanotechnology drug delivery market is expected to grow impacting health insurance (<http://www.researchandmarkets.com>). Consumers will use personalized medicine to create highly customized unique healthcare solutions that actively change the body's biochemistry putting an impact on health insurance sector. Medical advances will flatten cost curve as mortality and morbidity rates are dramatically improving and reduce litigation costs as medical product manufacturers provide evidence on efficacy of drugs trial. Risk management trend is to deepen and expand. Carriers will move from passively identifying and pricing risk, and reactively paying claims proactively under strategic decisions using big data in simulation techniques, real-time sensor data, unstructured data from social networks and multimedia (<http://www.fide.org>). In the US, 10 percent of all property and casualty claims are fraudulent, yet only 20 percent of those are detected (National Insurance Crime Bureau, 2013). Data analytics can improve the situation. 49% expected new sources and techniques in data analytics to be the key competitive differentiator (<http://www.pwc.com>).

ENVIRONMENT

The severity and frequency of natural and man-made catastrophic events is increasing. Between 1990 and 2009, hurricanes and tropical storms accounted for 45.2% of total catastrophe losses resulted in more sophisticated risk and risk transfer models to address the increasing severity and frequency of catastrophic events (<http://www.iii-insurancematters.org>). The rate and intensity of storms is predicted to increase with global climate change. A large portion of claims' payouts result from business interruption coverage losses and extra expenses (<http://www.insuringflorida.org>). Man-made and other environment degradation, increasing energy consumption and associated atmospheric pollution will directly impact carriers' risk exposure. Energy consumption will grow; rapid growth is projected for renewable, but fossil fuels continue to provide most of the world energy (US Energy Information Administration, 2010). Fossil fuel, atomic and thermal energy generation, poor air quality and pollution will remain significant health issue, threatening well-being of world populations.

ECONOMIC

Individuals are bearing increasing burdens of healthcare, both in cost and decision-making responsibility. Employment and income are economic determinants of health (<http://www.publichealth.lacounty.gov>). The rise of economic power in emerging markets and the outnumber of working age population is to continue over the dependent population, resulting in more productive growth, rise of middle class and expected to fuel health insurance (Economic Intelligence Unit, 2013). As consumption in emerging market countries increases, insurance market will grow, yielding opportunities for insurers. The developed market slowdown, due to the financial crisis, will accelerate the shift. 30% believed new emerging market insurers would move into developed world to become global insurers and 28% foresee truly global markets (<http://www.pwc.com>). After economic downturn, design and cost of employer-sponsored coverage changed and people are finding work that does not offer health benefits. Growth and consolidation are to continue to reshape health care delivery, but reform legislation could affect speed and direction of changes (<http://www.academyhealth.org>). Employees in low-wage jobs, small firms, and certain industries are likely to be uninsured when they lose jobs, but recession affects broader swath of the workforce. Reducing growth trajectory of health care costs may require new policies. Policies focused only on health insurance sector reform may yield results, but are unlikely to solve larger cost growth and limited access problems (<https://fas.org>). US economy shapes complex interactions among employment, health coverage, its costs and

financial access to health care outcomes. In economic-downturns, few employers drop health coverage, restrict employee eligibility and reduce costs by changing benefits and cost-sharing (<http://www.academyhealth.org>). Medical tourism is external drivers of growth of Indian healthcare insurance. India as medical tourism destination leverages the country's well educated, English-speaking medical staff, state-of-the-art private hospitals, diagnostic facilities, and relatively low cost to address healthcare costs of western world. India provides best-in-class treatment (Pricewaterhousecoopers, 2007). The comparative cost of health care procedure is shown below:

Cost of Key HealthCare Procedures				
Currency: USD	US	Thailand	India	India HC cost-x of US
Cardiac surgery	50,000	14,250	4,000	12.5
Bone marrow transplant	62,500	62,500	30,000	13.33
Liver transplant	500,000	75,000	45,000	11.11
Orthopaedic surgery	16,000	6,900	4,500	3.56

Source: India Brand Foundation Report, IBEF Research

POLITICAL

Harmonization, standardization, liberalization, privatization, globalization, integrity, transparency and accountability of insurance market; gaining citizens' trust in government as business environment creator and protector; creating level playing field for business; addressing public sector integrity, public procurement; and open government are the challenges faced by OECD countries including India affecting health insurance industry (<http://www.oecd.org>).

LEGAL

Accountable Care Organizations, 2013 is poised to see some developments and trends in US healthcare sector. The Affordable Care Act made mandatory to open state health insurance exchanges for public enrollment ensuring affordable health care insurance by introducing incentives as premium subsidies to ensure affordability; increased access to Medicaid through eligibility expansion; penalties will be imposed on individuals to encourage them to maintain required minimum health insurance coverage and employers who fail to obtain and provide essential health coverage (<http://www.deloitte.com>).

ADMINISTRATIVE

"Pay-for-Performance" and Medicare's "Hospital Readmissions Reduction Program" were adopted to curb costs. Employer-sponsored wellness services got momentum in US (<http://www.hcentive.com>). Regulatory reforms lifted India's economic potential. In several States, creation of regulators for public utilities and infrastructure (Regulatory Commissions), reduction in regulatory burdens for the services sector, and liberalization of the regulatory environment for investment and businesses led to enhanced economic performance in insurance sector. The role of IRDA and Ombudsman is increasing as private players are increasing in health care and insurance market including online marketing. Medical tourism needs further administrative attention.

CONCLUSION

STEEPLA factors have an impact on health insurance but not all changes will affect insurers positively. Forward-looking health insurers in developed countries are likely to grow in local markets by exploiting socio-demographic, technological, economical, environmental, eco-political, administrative advancement and simultaneously targeting emerging markets for growth by reshaping health insurance products for local markets while expanding on globally by building technical expertise and real time working. The pace and nature of growth is to observe changes in behaviors and dynamics of demand and supply; demand is increasing and supply is playing market making role. Growth comes at a cost; private insurers have to incur high expenses in increasing health insurance need-awareness, developing brand strength, establishing distribution channels and setting-up branch net-work and other infrastructure like on line sale-purchase facility. So, insurers' plans of obtaining break-even within first 7 to 9 years of operations are burdened with threats and challenges (<http://www.deloitte.com>).

SUGGESTIONS

Key trends critical in next five years are: reflexive and appropriate IT security that identifies and prioritizes gaps and vulnerabilities. A risk-based approach to customer data privacy is to be adopted. Social platforms to drive business intelligence and create new customer channels should be used. User experience should be used as driver of new products, services and marketing (<http://www.insurancetech.com>). The key megatrends, STEEPLA, are likely to influence health insurance sector as below:

SOCIAL

Government can stimulate growth of health insurance sector by encouraging better understanding of personal saving and financial planning through education. Increasing public awareness can be carried with local insurance industry sponsoring educational material under guidelines of Ministry of Education (<http://www.oecd.org>). Insurance companies should innovatively improve value proposition to customers to improve customer acquisition and operational performance to enhance profitability (<http://www.deloitte.com>). Financial inclusion and micro-health insurance can enhance the scope of health care and insurance.

TECHNOLOGICAL

Technology playing leading role on frontier of health insurance can help in detecting fraud. Card-based payment can drive speed and efficiency of transaction processing (<http://www.insurancetech.com>). As internet ensures real-time information and big data, insurers should exploit it for better pricing, underwriting, and loss controlling to have competitive advantage. Global investment in advanced analytical techniques is needed to develop capabilities to process large unstructured and multimedia data as continuous real-time video, life blogging and social chatter. Advances in artificial intelligence techniques, as machine learning, natural language understanding and intelligent decision-making should be used to advance transaction processing to decision-making. The health insurance industry must improve existing processes; develop new processes and capabilities to meet new customer demands by; **Cloud Computing**: The Cloud can change health insurance scenario by moving at speed and scale to address new opportunities, improve responsiveness and enhance processes like, underwriting. It permits scalable faster quote processing and more accurate risk pricing. Cloud and digital mobile channels enables health insurer to 'stretch the walls' of computing capacities and respond to peak demands at lower cost. Insurers can master huge internal and external data to improve processes, enhance customer service, create products around customer and meet regulations through cloud where security and data privacy permit to maximize gain in productivity and profitability; **Architecture around Business Goals**: The insurers are to move from architecture based servers to architecture built around service to achieve business goals. Data should be used as platform to be distributed wherever it is needed. The architecture should allow decoupling distribution from manufacturing to create more agile and flexible systems that respond faster to product development and launch of product factories. Insurers should provide product management staff with ability to configure products using various variable inputs; test them and decide to launch or abandon without referring supportive technical team.

Front office systems can be aggregated and integrated to deliver seamless channel experiences to customers (<http://www.insurancetech.com>); **Preventative Business Modeling**: From reactive to preventative business model shifting needs to be ensured. Connected devices and sensors to develop and improve risk and loss management system to improve productivity are needed in health insurance industry; **Nano-technology Usage**: Nano technologies, having potential to dramatically improve health outcomes through enhanced monitoring and preventive control over chronic disease be considered for envisioning health insurance sector (<http://www.researchandmarkets.com>); **Customized Health Care Services**: Medical service and treatment model needs to be evolved towards customization of healthcare service to reduce cost and increase effectiveness; **Loss and Risk Management**: Loss and risk management in health insurance needs more sophisticated risk modeling and innovativeness in structuring risk-sharing and transfer deals. Workable insights reduce losses and provide better risk management for good customer experience and competitive advantage. New sensing, monitoring devices and technology, together with risk transfer mechanisms, can extend general health, cushion insurers and reinsurers against abnormal losses (<http://www.fide.org>); **Data Analytics**: Data analytical techniques can be used for decisions using unstructured data as social media devices, video and audio. Complementing structured data should be ensured in strategic forward-looking decisions to achieve enhanced customer insight and more efficient business processes. Predictive and behavioral analytics integrated with business processes can address changing

customer behavior. Service product innovation becomes more effective and faster when analytics are in the mix. Data analytics can assess likely take-up of health insurance product. It can model the impact of price changes and different features; and create real-time insights; fine-tune service products; and detect fraud in claims.

ENVIRONMENT

Positive environmental factors sustain health, and promote preventive medicine. They include: sources of nutrition, farming: soil quality, water availability, biodiversity/bio-integrity, genetically modified organisms; hunting, fishing: wildlife, fish populations, drinking water, cooking; cleaning/sanitation; air quality; ozone layer for protection from UV, cancers, etc.; space for exercise and recreation; sanitation/waste recycling and disposal. Negative environmental factors causes for health insurance include: environmental conditions favoring disease vectors as endemic and exotic vectors; invasive biota like, viruses, bacteria, their hosts; environmental disruptions: floods, droughts, storms, fires, earthquakes, volcanoes; air quality: pollen and pollution leading to respiratory diseases or cancers; water quality: biotic and a-biotic contaminants; integrity of water transport and treatment infrastructure; monitoring and management of municipal, agricultural, industrial outflows to the environment such as gases, liquids, solid wastes; human changes of the environment that create conditions favoring disease; disturb and release noxious levels of previously bound chemicals; create temporary, intense, life-threatening heat islands; urban heat waves exacerbated by climate change; result from nuclear, biological or chemical warfare, terrorism and violence (<http://www.athenaglobal.com>). Space based environmental observatory play roles in: environmental information for optimizing use of health resources; distribution of health advice and treatment by health staff; treatment facilities, etc. Modeling of health, impact of environmental parameters and prediction of longer-term health resource needs environmental planning, remediation for mitigation and adaptation to global changes (<http://www.athenaglobal.com>). Health insurers are to monitor trends in atmospheric pollution by technology to assess risk in different regions and mitigate the serious consequences. Catastrophe modeling has become more sophisticated and advanced in early warning technologies to underwrite in specific catastrophe prone areas resulting into loss of health. Insurer not keeping pace with increasing sophistication might be forced to exit markets (<http://www.fide.org>). Geographical Diversity may be looked upon as risk minimization and mitigation tool.

ECONOMIC

Economic factors include overall health of the markets, consumer preferences, world news and events. The economic global factors that affect health insurance industry must be contemplated while planning. Interest rates can prevent customers from borrowing to finance purchase of health insurance products and services. High interest rates also deter health insurance companies from investing in new capital and expansion. Falling interest rates can stimulate the industry to grow, leading to innovation and higher employment. The value of the US dollar compared to other foreign currencies is important for insurance companies. The economic state of the country and consumer confidence can also spur growth and development or harm it. In recessionary times, companies should also scale back production, hiring and the development of new products and services to ensure that their finances can weather the storm; consumers should begin limiting their purchases even insurance products and in overall economic growth, companies should once again expand (<http://www.smallbusiness.chron.com>). Income tax deductibility incentives on health premiums paid be given and the tax treatment of the health insurance company should be offered tax rebate. Tax subsidies should be viewed by governments as good investment by tax payer.

POLITICAL

There is a need to have adequate domestic saving to finance domestic capital expenditure. If domestic saving is too little, then the ownership of the economy will gradually tend, directly or indirectly, to fall more and more under foreign control. Balance needs to be struck between level of domestic and foreign ownership within a country, a level which will depend on the political preferences and indeed on the psychology of the nation itself (<http://www.oecd.org>). Insufficient reserves, rapid growth, overstated assets, fraud and catastrophic losses have been identified as the contributing factors (<http://www.oenb.at>). Government stimulation should scan policies to stimulate growth of its national health insurance industry. Health insurance market grows faster if it is opened to foreign competition than if they are closed. Foreign health insurance brings new products, new marketing and distribution techniques and new methods of management and organization. Efficient management of health insurance depends more and more on up-to date IT systems, including specialist software bought by foreign partners. Foreign health insurance companies which enter a country have to take a long term view on their

investment, since profitability from a health insurance operations take a long time to emerge. Hence, health insurance companies can be expected to be more committed for long term to the market. The three main entry strategies for a foreign health insurance company can be operational: establishment of a new local health insurance company; take-over of local company; or joint venture with local partner. Governments must decide for the balance between domestic and foreign ownership in the short term, but in the longer term the balance should be left to be decided by the market forces.

LEGAL

The use of regulation as instrument to attain economic and social policy objectives has increased. Regulation of private conduct has become fundamental tool of government in managing its complex and diverse society and for allowing competing economic interests to be balanced (<http://www.oecd.org>). The controlling and administrative law needs to be transformed into self regulations supervised by regulatory bodies.

ADMINISTRATIVE

Administrative simplification program is needed to reduce burdens and costs on businesses. The government must create a sound but flexible system of regulation and supervision to increase public confidence. Insolvency of even one health insurer can undermine public confidence. Marketing of health insurance requires supervision. Agents, brokers and insurance intermediaries advising and selling to public must meet minimum professional education and ethical standards, and competence. Insurance regulation should not be too restrictive in the classes of health insurance products. Consumers need to have choice in company and product selection and change along with need based health insurance solutions.

IMPLICATIONS

It implies that insurance is risk minimizing and mitigating financial product. Awareness and financial inclusion especially in health care insurance is increasing due to IRDA. Technology is playing a dynamic role in health insurance sector. Demand and supply in health care insurance both are increasing in favorable environment but a lot is to be still covered. Environmental issues are having great concern in India where varied geographical diversity may be used as risk reduction measure. Government and private players are complementing to each other. Political will favors globalization of health insurance industry. Administrative reforms are being converted into regulative guidelines.

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Integration of Competent Individuality in Knowledge Economy: The Infinite Struggle towards Excellence

Guru Tej S, Islington College, Kathmandu, Nepal (gurutej@hotmail.com)

ABSTRACT

The twenty first century can be termed as the “knowledge century” as knowledge has become the main driving force behind economic, societal, political, technological, spiritual and every other forms of development. With profound economic restructuring, the knowledge based sectors are growing in importance. In the present day context, knowledge is nothing but information with a purpose. Data and information are the two important components of knowledge, while knowledge has become a highly context specific interpretation that individual and social groups give to their observations of the world around them. To a common man and in a traditional sense, knowledge means the totality of what is known about a subject, phenomenon or concept based on awareness, understanding and experience. It’s clearly visible about the gradual shift from conventional concept of land, labor, capital, production to knowledge production. The newly built globalized economy witnesses new dimensions in the field of research to produce innovative knowledge and expertise. Skilled knowledge has now become an important factor of production.

*Keeping these factors in mind, a **Societal Individual Matrix** can be devised, which portrays the struggle between an **Individual within Self** and **Individual in Society**. This matrix would explore options in analyzing as well as interpreting an individual’s characteristics with respect to the dignity struggle, caste, religion, class, education, society, etc within the self and in a congregate to move forward in the knowledge era.*

Objectives of the Paper:

1. To study and analyze the concept of ‘individual’ in knowledge economy
2. To understand the individual’s struggle for existence in knowledge economy

Key Words: *Individual, Knowledge Economy*

Review of literature:

Individual

As commonly used, an individual refers to a person or to any specific object in a collection. In the 15th century and earlier, also today within the fields of statistics and metaphysics, individual means "indivisible", typically describing any numerically singular thing, but sometimes meaning “a person”. From seventeenth century on, individual indicates separateness, as in individualism. Individuality is the state or quality of being an individual; a person separate from other persons and possessing his or her own needs, goals, and desires (Oxford Dictionary, 2006).

Knowledge Economy:

Davenport and Prusak (1998, p.5) wrote that “knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experience and information”.

A knowledge-driven economy is one in which the generation and exploitation of knowledge play the predominant part in the creation of wealth (UK Industry, 1998). In the industrial era, wealth was created by using machines to replace human labour. Many people associate the knowledge economy with high-technology industries such as telecommunications and financial services.

Knowledge economy is a complex model of interweaved connection of tangible network of information (tacit turned explicit) derived from learning curves and benchmarks of the different social groups within and among the organizational social groups.

The social dimensions here represent the influence of culture, learning system and hierarchy of orders (structure) of the organization on the processing, implementing, sustaining and disseminating of knowledge flow across the parts of the organization; important for organizational effectiveness (Kumar, September 2009).

Individuality in knowledge economy:

Views on Individualism

Descartes: In his statement, Rene Descartes (in his reference work; “I think therefore I am”) posits the notion the individual, distinct from the world around him or her.

Empiricism: Early empiricists such as Ibn Tufail and John Locke introduced the idea of the individual as a tabula rasa (“blank slate”), shaped from birth by experience and education. This tie into the idea of the liberty and rights of the individual, society as a social contract between rational individuals, and the beginnings of individualism as a doctrine.

Hegel: Hegel regarded history as the unfolding of God's plan through a process of thesis, antithesis, and synthesis. The role of the individual in this view was as an agent of this unfolding--a part of a greater whole.

Existentialism: With the rise of existentialism, Kierkegaard rejected Hegel's notion of the individual as subordinate to the forces of history. Instead, he elevated the individual's subjectivity and capacity to choose his or her own fate. Later Existentialists built upon this notion. Nietzsche, for example, examines the individual's need to define his/her own self and circumstances in his concept of the will to power. The individual is also central to Sartre's philosophy, which emphasizes individual authenticity, responsibility, and free will. In both Sartre and Nietzsche (and in Nikolai Berdyaev), the individual is called upon to create his or her own values, rather than rely on external, socially imposed codes of morality.

Martin Buber: In “I and Thou”, Martin Buber presents the individual as something that changes depending on how he or she is relating to the outside world, which can be in one of two ways: In the I-it relation, the individual relates to the external world in terms of objects that are separate from him or herself (an “I” looking at an “it”). In the I-thou relation, the individual has a personal connection to the external, and feels almost a part of whatever he or she is relating to.

Buddhism: In Buddhism, the concept of the individual lies in anatman, or “no-self.” According to anatman, the individual is really a series of interconnected processes that, working together, give the appearance of being a single, separated whole. In this way, anatman, together with anicca (all of conditioned existence, without exception, is in a constant state of flux), resembles a kind of bundle theory. Instead of an atomic, indivisible self distinct from reality, the individual in Buddhism is understood as an interrelated part of an ever-changing, impermanent universe.

Objectivism: Ayn Rand's Objectivism regards every man as an independent, sovereign entity who possesses an inalienable right to his own life, a right derived from his nature as a rational being. Individualism and Objectivism hold that a civilized society, or any form of association, cooperation or peaceful coexistence among men, can be

achieved only on the basis of the recognition of individual rights — and that a group, as such, has no rights other than the individual rights of its members. (Wendy R, 1999)

Food provides stamina to the human body; similarly knowledge provides stamina to the human mind to make him fit in the knowledge economy. Therefore consciously or subconsciously every individual struggles to upgrade himself as per the requirements of knowledge economy.

Individuals Struggle for Existence in Knowledge Economy

Knowledge is a stable connection between one signal (event) and another signal (event) owned by an individual. Accordingly, accumulation of knowledge is the storage of stable connections. Within the process of globalization knowledge has become one of the most important factors to achieve positive development. Here economic prosperity, personal development, safety issues, competitiveness, etc. go hand in hand. For every Nation and every firm as well as for every individual human being; knowledge is one of the basic instruments to achieve goals, make a living, to make profit to improve their standard of existence (Freeman, 2002).

The world is moving towards a knowledge based economy and therefore also knowledge based society. An individual may be involved in different kind of work; may it be high profile or low profile job knowledge is a key factor for every individual in economic and social development. Success and growth are often determined through access to certain required knowledge. Knowledge has become an important resource just as for example raw materials. The uneven distribution of access to knowledge and learning sources creates circles which have access to all the advantages of the globalised knowledge economy while others are completely left out (Mill, sparknotes.com/philosophy, 2013).

Tacit knowledge: Tacit knowledge is one which cannot be expressed atleast not exactly can be stated (Tao Te Ching). Tacit knowledge is the knowledge that is difficult to be transferred to another person by means of writing down or verbalizing it. With tacit knowledge, people are not often aware of the knowledge they possess or how it can be valuable to others. Effective transfer of tacit knowledge generally requires extensive personal contact and trust.

Explicit knowledge: it is visible in the sense that can be expressed through communication forms for dissemination. One can have access to the explicit knowledge in the form of data, manual etc.

The people who are literates and know to draw some time between their works can easily get exposed to the explicit knowledge which helps them in upgrading their knowledge. But if the person is illiterate, then he has to always depend on someone else to gain knowledge. Because these people rely a lot on the tacit knowledge which should be shared by their colleagues, friends or others with whom they have well contacts and trust. It is also true that, just because the person is literate it is not easy for him to gain the knowledge. He may have access to knowledge but understanding of that knowledge would be tough; and person starts struggling (Sharma, 2006).

As knowledge is the base for human behavior and practice, each individual struggles in order to get tacit as well as explicit knowledge.

The challenges in creation of a knowledge economy

An individual mainly faces 4 important challenges in creation of a Knowledge economy: Access to capital, Access to Technology, Access to Skills, Policy backing by the leadership (Sharma, 2007)

The way through to grab opportunities

The individuals as creators of a knowledge economy need to adopt encourage and equip themselves and others within the group to:

- ✓ Challenge own assumptions
- ✓ Understand how their actions can help or hinder creativity and innovation

- ✓ Learn to trust, accept (and productively manage) 'maverick' behavior
- ✓ Structure work to maximize learning opportunities
- ✓ Accept that some mistakes will occur
- ✓ Coach and Mentor others as an intrinsic part of the knowledge creation
- ✓ Redefine problems as learning opportunities
- ✓ Recognize and reward innovative contributions

Working in such a way involves fostering innovation and creativity towards a common end. For this, the leadership in the organizations working towards creating a knowledge economy needs to involve in:

- ✓ Encouraging collaboration
- ✓ Making ideas accessible
- ✓ Exploring (and resolving) conflicts
- ✓ Encouraging dialogue
- ✓ Encouraging a sense of community, common interest and trust.

Such involvements and enhancements in developing a knowledge economy would come from:

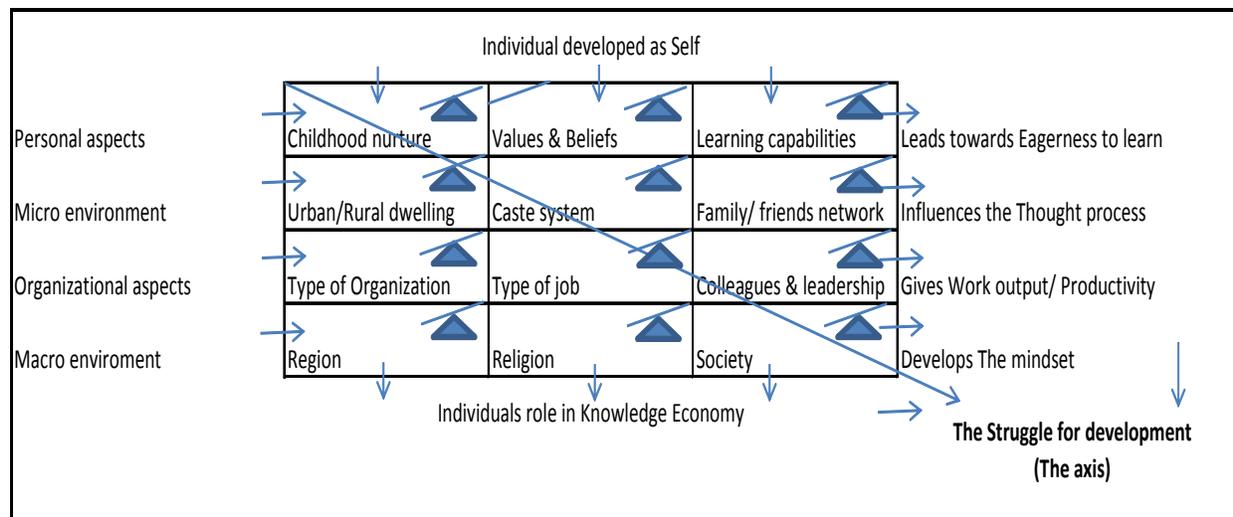
- ✓ Encouraging individuals to use their knowledge and expertise
- ✓ Facilitating innovation and creativity and encouraging new ideas
- ✓ Representing the interests of the team/individuals to the organization
- ✓ Supporting the work of teams, both physical and virtual.

A conducive environment needs to be created with the following aspects in order to drive the economy towards making it into a knowledge economy by every individual:

- ✓ Networking and broad contacts externally and internally
- ✓ Respect for individuals as a knowledge resource
- ✓ Creativity and innovation
- ✓ Trust, Sharing of ideas and information
- ✓ Sound underlying systems and procedures
- ✓ Continuous learning and development

The Societal Individual Matrix: The struggle

The below matrix tries to portray an individual's roles and contribution to a knowledge economy which in turn has its effect on his struggle for knowledge. This matrix is designed based on Dialectical Indicator Matrix by Dr. Subhash Sharma in *New Mantras in Corporate corridors – From Ancient Roots to Global Routes*



Societal Individual Matrix(SIU)

Every individual's role in the development of the self which leads to the development of the knowledge economy is acknowledged to various identifiable factors in the blocks of Societal Individual Matrix like; Childhood nurture, Values & Beliefs, Learning capabilities, Urban/Rural dwelling, Caste system, Family/ friends network, Type of Organization, Type of Colleagues & leadership, Region, Religion, Society. However, it can be noted that, the factors of knowledge development in the blocks cannot be restricted to the factors in the SIM.

The factors related to **personal aspects** like childhood nurture, values & beliefs and learning capabilities leads the individual towards eagerness to learn. This eagerness to learn creates a need for the individual to strive for continuous struggle to develop himself in a knowledge economy.

The factors in **micro environment** (the environment surrounding the individual) like urban/rural dwelling, caste system and family/friends network influences the thought process of the individual. This thought process of several individuals will contribute to the development of knowledge economy. These factors are also very much responsible for the struggle every individual faces for their existence in a knowledge economy.

The factors related to **organizational aspects** where an individual work/serve for their earning also contribute towards the development of individual and in turn towards the economy as a whole. The factor can be but not limited to type of organization, colleagues and leadership. The learning of the individual in the process of his/her work in organization contributes to the growth of knowledge economy.

The factors in macro environment (the environment which influences individuals from the time their mind starts developing learning attitude) include region/demography, religion and society. These factors influences the mindsets of the individuals towards learning attitudes making way to development of knowledge within the individual, hence developing the group/herd/society he/she living in.

However, it can be noted that, the factors leading to knowledge may not be limited to the identified blocks of the matrix, there are universal elements which have their influence on the learning process of individual and the matrix can expand to the limits of thought. The matrix applicability can be seen in a broader sense to understand the contributors of development of an knowledge economy. The factors in the matrix blocks can change from one economy to another and according to the individuals dwelling in such economy.

Conclusion:

Today; knowledge has become the main driving force for the economic development. With profound economic restructuring, the knowledge based sectors are growing in importance. In the present day context, knowledge is nothing but information with a purpose. Data and information are the two important components of knowledge.

The meaning of knowledge may differ from person to person. For a common man knowledge may be awareness, for a student - knowledge may be something that is taught in school, for a research scholar knowledge may be the new findings. But irrespective of understanding the knowledge in different ways every individual is a contributor to the knowledge enhancement. Knowingly or unknowingly every individual struggles for knowledge, struggles to keep himself updated to sustain in knowledge economy.

Many times, knowledge struggle may not happen openly. An individual may struggle within himself or in the organization or even in the society as a whole. There is no end for the knowledge struggle, especially in the 21st century which is more so known as “knowledge era”. The degree of individual knowledge struggle is dependent on the individual’s several micro and macro factors classified across the human background and characteristics like family background, value & beliefs, caste system, learning capabilities, profession, the surrounding environment and many more.

The ‘Societal Individual Matrix’ is a model that helps in understanding the knowledge struggle of an individual within himself as well as in the society. This model when applied in micro sense can be a pointer for each individual’s growth and struggle for growth in the knowledge economy. Same way, the SIM applied in macro sense can portray the contribution of society/group/community comprising of several individuals towards the growth of knowledge economy.

However, it can be noted that, the factors leading to knowledge may not be limited to the particular factors portrayed in the matrix, there are universal elements which have their influence on the learning process of individual and the matrix can expand to the limits of thought.

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The Changing Nature of Computer Ethics

**Rebecca A Faucette
Regent University**

The virtual world is constantly evolving as new technologies are introduced and dispersed to the population. As the nature of this market is ever-fluctuating, precautions must be offered in proportion to the technology itself. While the internet poses serious security challenges, these challenges can be identified and addressed, to some extent. Cyber ethics is a unique field. This paper will examine the complex issue of cyber ethics, specifically addressing the interrelated issues of speech, property, privacy, and security within the context of the virtual world.

Cyber ethics includes the entire realm of human behavior. Ethical issues arise daily with the ever-changing nature of the Internet. As the Internet has grown, public demand for Internet services has increased. One of these services, and arguably the most frequently utilized, is online communication. "Online communication has been evolving and growing at an unprecedented pace, and there is every indication that the demand for it will continue" (Johnson, 26). As demand grows, security threats grow as well. Johnson continues: "Its evolution has not been without problems and the most disruptive of these behaviors involves human behavior" (26). Clearly, this is a moral issue as human behavior necessarily forms around a certain set of values. If these values are nonexistent or ignorable, ethical problems arise. These ethical problems include privacy and property which goes back to lack of a common code of values and lack of personal responsibility.

The author identifies three distinct areas of online communication: scope, anonymity, and reproducibility. These communication characteristics will be analyzed in their relation to internet ethics. The first characteristic is scope. Scope is defined as "power... the combination of vastness of reach, immediacy, and availability to individuals for interactivity" (Johnson, 28). This is essential as the Internet has a massive, multi-cultural audience that is constantly growing. The second characteristic is anonymity. "Anonymity may be said to be favored in online communications... anonymity creates problems of integrity. The anonymity disconnects the words from the person" (Johnson, 29). Arguably, this is a significant virtual problem as it addresses the issue of privacy and false identities. These issues will be addressed by this paper later. The third and final characteristic is reproducibility. "Reproducibility creates the possibility of permanence, or endurance of information. The problem of integrity of information that arises from anonymity also arises from the reproducibility of information" (Johnson, 30). All three areas of online communication have their strengths and weaknesses. Each can be improved to make internet security tighter and more effective for the users.

Next, speech will be evaluated. The first aspect that must be considered is free speech. The issue is whether or not certain types of speech are permissible in an online environment, where multiple age groups have access. Tied into this issue is the knowledge that restricted access to certain criteria is preset by the website manufacturer. "The basic concern is that the features for blocking or restricting access are determined on the basis of criteria unavailable to the user" (Rosenberg, 164). These problems include: oversimplification, over breadth, feasibility, subjectivity, full disclosure, and security (Rosenberg, 165). While it is essential to filter and block certain content, this censure must not infringe on civil liberties in the process.

As can be imagined, it is fairly difficult to maintain a healthy balance between freedom and censorship in regards to internet content. Rosenberg notes, "some religious and politically conservative groups urge the government to take action to protect their children from Internet dangers...this segment of society has certainly set the agenda for regulation and control with the result that filtering and blocking have become the preferred method to deal with sexually explicit and otherwise possibly controversial Internet content"(165). As noted, it is difficult to maintain that healthy balance of permissible versus explicit content. The problem with free speech is that everyone cherishes their own ideas of what free speech entails and multiple interpretations abound.

However, the government has put certain specific regulations and laws in place when it comes to internet obscenity and censorship. It is a difficult area to regulate as it is so expansive. "The issue of what is obscene has been debated in the court systems of the United States for a long period of time...the growth of the Internet has forced the Supreme Court to revisit this slippery issue that lives somewhere between community protection and freedom of speech"(Taylor etc. al., 184). The Supreme Court has the difficult, some would say insurmountable, task of protecting the public from offensive material while maintaining the freedom of a very profitable industry:

pornography. "In terms of monitoring, the government had a relatively easy job of tracking and preventing illegal types of pornography from circulating in the United States... the Internet changed all that and made pornography widely available to the general public"(Taylor et. al., 184). This presents a problem for the government as they must ensure that minors do not have access to this explicit content.

The definition of obscenity has been argued over numerous times; the issue at question is children's access to pornographic materials. While everyone agrees that this is reprehensible, the method of correcting this problem is controversial. On the one hand is governmental regulation of the Internet and on the other is free speech. "The government's position has consistently been that the onus of regulation is on Internet Service Providers, and the people and businesses who wish to post, sell, or disseminate pornography"(Taylor et. al., 185). The government has passed multiple laws to deal with the ever-growing problem of child pornography. These laws include the recent Prosecuting Remedies and Tools Against the Exploitation of Children Today Act (PROTECT Act) of 2003. The PROTECT Act has been influential in many ways. "The PROTECT Act strengthens existing U.S. law by increasing imprisonment penalties to 30 years for convicted sex tourists, criminalizing persons or organizations that assist or organize sex tours, and better enabling federal prosecutors to convict offenders by modifying burden of proof requirements"(Taylor et. al., 190). The United States government will continue to pursue laws and policies that protect the younger generation of Americans from harmful internet content, specifically pornography.

Next, the property element of internet security will be examined. What is and what is not protected as intellectual property? The first aspect of property to be examined is copyright. Shelly Warwick writes, "The legal basis for copyright in the United States is Article 1, Section 8 of the Constitution, which empowers Congress to 'promote the progress of science and the useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries'" (268). Importantly, it is noted that copyright protection was only afforded to American citizens (Warwick, 268). This is due to the fact that Article 10 of the Constitution delineates all powers not given to the federal government to the state governments and their people.

Over the years, there have been multiple changes to copyright laws as the internet industry has shifted and expanded. "United States copyright law has been constantly revised to embrace new media and to provide a wider range of user rights to copyright holders, usually in reaction to copyright not prohibited in the current law but deemed unjust or unethical by the Courts or Congress"(Warwick, 269). Current copyright law protects original works of expression. However, "copyright protection is not provided to ideas, procedures, processes, systems, methods of operation, concepts, principles, discoveries, short phrases, facts, or works created by the United States government"(Warwick, 270). Succinctly stated, the work must be the intellectual's own work, not derived from any other source, especially the individual's government.

There is ongoing controversy over whether copyright is ethical. Warwick writes: "Copyright no longer has a consistent theory, let alone an ethical position. Copyright law avoids taking an ethical position but endeavors to affect a compromise between the expectations of creators and users by creating a period where the expectations of the creators are recognized by law"(Warwick, 272). Mitch Bainwol and Cary Sherman believe that it is important to implement stricter measures for students that illegally utilize internet copyrighted items.

This is an example of a situation in which students are behaving in an unethical manner- essentially stealing intellectual property. "The Recording Industry Association of America, on behalf of its member labels, recently initiated a new process for lawsuits against computer users who engage in illegal file-trafficking of copyrighted content on peer to peer systems... in the new round of lawsuits, 400 of these legal actions were directed against college and university students..."(Bainwol & Sherman, 169). Clearly, this is a serious ethical issue and a prevalent concern on college campuses nationwide. "It's not just the loss of current sales that concerns us, but the habits formed in college that will stay with these students for a lifetime" (Bainwol & Sherman, 168). This is but one example of many, many examples of copyright fraud around the country. This is a more serious problem than many realize as it affects more than just the users themselves.

The second aspect of property to be examined is plagiarism. Plagiarism is a growing problem. John Snapper makes the argument that plagiarism on the web is more detrimental than piracy. "The obvious candidate for plagiarism harm is the author who receives no credit...unless there is also copyright infringement, an author has few legal grounds for claiming economic loss for a plagiarized use of his work"(Snapper, 282). However, Snapper makes the claim that the real harm is not to the author himself, but to the public in general. "...the actual harm done by plagiarism is harm to the reading public...plagiarism cheats the public by presenting claims with a misleading or hidden provenance" (Snapper, 283). It is as simple as this: authors deserve credit for their work. Plagiarism steals that intellectual work and it is illegal.

The third, and arguably most important, aspect of property that will be evaluated is identity theft. This is a prevalent problem in the virtual world. One author notes the abundance of crimes that occur based on the relatively easy access to the internet. Among these crimes is identity theft. "The exponential growth in the incidence of identity theft can largely be attributed to the creation of opportunities that are directly linked to technological and commercial advances" (Taylor et. al., 108). The oft-quoted adage "with great power comes great responsibility" is quite appropriate in this situation. The Internet provides multiple services that greatly simplify the consumer's life. However, with this increase in services comes an added increase in security risks, which is evident by the prevalence of identity theft.

As a way to curb identity theft, Anita Ramasastry advocates for consumers to have the right to freeze their credit history. She writes, "The right to freeze one's credit history ought to be triggered as soon as suspicious activity occurs- before identity theft occurs. The result of the freeze would be simple: identity thieves would not be able to open new credit accounts or obtain credit easily (Ramasastry, 116). Although this is an interesting proposal the author notes it would only be viable if consumers were willing to freeze their accounts. This proposal might present a bit of a challenge.

Identity theft is a growing problem. Identity theft and e-commerce are strongly interrelated as the consumer must, in many cases, provide his Social Security number to pay for an online product (Taylor et. al., 109). Nothing is entirely secure anymore. As Taylor and his colleagues note, "Once personal identifying information is obtained, thieves can ransack a victim's financial status and destroy their credit history with frightening ease" (110). This is troubling indeed. Positively, legislation has been enacted to counteract this destruction of lifestyle. Congress enacted the Identity Theft and Assumption Deterrence Act in 1998. This law makes it a federal crime to assume an identity other than one's own and is punishable by up to 15 years in prison (Taylor et. al, 111). Although this is an important step in the right direction, federal authorities still face an uphill battle. Identity theft is a difficult crime to prosecute as it is often detected too late to truly make a difference.

Next, the crucial issue of privacy will be examined. "A fundamental problem about defining the concept of privacy in terms of individual control of information is that it greatly reduces what can be private... we control so little...we cannot possibly control vast amounts of information about us that circulates through myriads of computer networks and databases"(Tavani & Moor, 378). It is virtually impossible to maintain one's privacy when connected to the Internet. The authors note: If privacy depends on our individual control, we simply don't have significant privacy and never will in a computerized world" (379). It is and always will be difficult to maintain a sense of protection on the web, as it is by nature, open to everyone.

One idea that has been introduced to strengthen user privacy is workplace surveillance. This idea comes with the expected amount of resistance. "Employees do not fear the transparency of surveillance...it is rather the choices, both explicit and implicit, that the employers will by necessity be making that the employees mistrust" (Introna, 422). Employees want their actions to be accurately represented. The author argues that "the development of the workplace privacy debate will be best served if it is developed along the lines of fairness and organizational justice rather than along the lines of a general notion of privacy" (Introna, 423). Workplace surveillance can be a positive, productive move for businesses if they are completely transparent about their intentions with their employees. Incorrect impressions, once formed, are hard to break.

Lastly, internet security in its various forms will be evaluated. The first breach in security is piracy. Orrin Hatch argues that piracy threatens the very foundation of the entertainment industry. "For-profit global piracy rings... threaten the future of today's cinema and recording industries. Research suggests that these piracy rings will create between 12 and 24 billion infringing copies this year alone" (Hatch, 52). Internet piracy is a growing epidemic. "Piracy and counterfeiting are areas where some of the best estimates exist on the impact of computer crime" (Taylor et. al., 355). And criminals are getting away with this crime. Hatch notes, "The architects of this file-sharing piracy make millions of dollars while attempting to avoid any personal risk of the severe civil and criminal penalties for copyright infringement" (52). Thus, they are stealing valuable intellectual property and making a profit off of it; this is reprehensible behavior.

Graham Spanier is of the opinion that colleges should take more of a stand in combating internet piracy. He writes, "It is now time for colleges and universities to take aggressive steps to combat the piracy of copyrighted material that is rampant across the country" (133). Spanier notes that it is important to combat internet piracy not just for moral reasons, but for economic reasons as well. "...there are tangible consequences to illegal file-sharing...the massive quantity of pirated files being uploaded and downloaded is devouring our bandwidth... and slowing down our networks"(133). This harm extends to the entire virtual world. Thus, Spanier advocates for

colleges to enact stricter penalties for students who file-share, such as revoke their internet privileges. This may be a very good place to start.

Secondly and arguably most importantly, is the rise of cyber terrorism. This is the result of a lack of secure technology. Simon Finch argues that cyber terrorism is an immediate threat to global security. "Whether it is financial turmoil, power cuts, traffic chaos, hijacking into broadcast satellites or targeting logistics companies to deliver food to supermarkets, there are myriad possibilities for the determined hacker to complete"(Finch, 37). Cyber security is a serious problem and it affects everyone. "The acts of terrorism aimed at critical information infrastructure are simply new tactics to accomplish the same end... what were supposed to be the hallmarks of advanced societies to increase democratic and free thought have now become huge vulnerabilities"(Taylor etc. al., 61). Internet security is vulnerable and it needs to be strengthened.

Furthermore, the Internet perpetrates this culture of cyber terrorism. Coll and Glasser explain: "Al Qaeda suicide bombers and ambush units in Iraq routinely depend on the Web for training and tactical support, relying on the Internet's anonymity and flexibility to operate with near impunity in cyberspace" (96). This is serious business. The internet, by its very nature, is endangering American security. "Until recently, al Qaeda's use of the Web appeared to be centered on communications: preaching, recruitment, community-building and broad incitement. But there is increasing evidence that al Qaeda and its offshoots are also using the Internet for tactical purposes, especially for training young adherents" (Coll & Glasser, 102). This is seriously alarming as it amounts to a possible future security breach.

What can be done to counteract these virtual security breaches? Several security technologies have been introduced in past years. The first and most common security technology is backups. "Backups are the single most important security measure a company or individual can take" (Taylor etc. al., 340). Backups are essential because they serve to back up data before it can be lost or stolen. As they copy the original data, they can recover it for the user. The second security technology is firewalls. "A firewall is a device or software that acts as a checkpoint between a network or standalone computer and the Internet... it checks all data coming and going" (Taylor etc. al., 341). This is extremely useful as it can detect suspicious data or software and reject it. However, the author cautions, firewalls "are not the single solution to network security...they are part of the overall security strategy" (Taylor etc. al., 344).

Finally, the last security strategy is cryptography. Cryptography is described in this manner: "An encryption program scrambles information in a controlled manner through the use of cryptographic key. Only those with access to the key can read the encoded material" (Taylor etc. al., 29). This is a more sophisticated security technology and thus, highly effective. "Couriers for the terrorist group al Qaeda have been intercepted while carrying encrypted diskettes" (Taylor etc. al., 30). These methods of security, while effective, are not entirely secure as the Internet itself is constantly being compromised. But they are useful and necessary.

In conclusion, the changing nature of cyber ethics was thoroughly examined through the analysis of four separate aspects: speech, property, privacy, and security. These aspects were evaluated through the use of multiple perspectives. Internet security is a grave problem that must be counteracted through the security technologies of backups, firewalls, and cryptography. The Internet is both risky and a great asset; users should be educated before utilizing the Internet.

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EMPIRICAL ANALYSIS OF PRIVATE ENERGY PROVIDER RESIDENTIAL MARKET SHARE IN ELECTRICITY MARKET IN USA

L. Jide Iwarere, PhD

Department of Finance, International Business and Insurance, Howard University, Washington, DC 202-806-1634 liwarere@howard.edu

Philip Fanara, Jr., PhD

Department of Finance, International Business and Insurance, Howard University, Washington, DC 202-806-1593 pfanar@howard.edu

Haydar Kurban, PhD

Department of Economics, Howard University, Washington, DC hkurban@howard.edu

ABSTRACT

In this paper we examine the determinants of residential electricity provider market share. We focus on deregulation in terms of the energy providers entering the market; and consumer's actual action in selecting residential energy providers. Our investigation of private provider participation confirms the hypothesis of profit motivation on their part. This motivation, which drives private participation, runs at cross purposes with the public regulators' intent of driving down prices via competition. It also explains, in part, the motivation for recent roll-back in utility deregulation. Our findings indicate that the higher the population density, the higher the average residential price per kilo-watt-hour; and the larger the commercial and industrial market share of energy providers, the higher the residential market share of private energy providers in the state.

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INTRODUCTION

We attempt to answer the question of why some states have larger energy provider market shares than others. We focus on deregulation in terms of the consumer's actual action in selecting residential energy providers.

Specific Questions:

- A. What are the economic and demographic factors that encourage residential electricity deregulation in a state?
- B. Why have some states moved faster than others to deregulate the residential sector?
- C. What factors attract energy providers to the some residential electric markets rather than others, beyond such things as politically motivated incentives?

Our 'a priori' conjectures

Major driving forces behind residential electricity deregulation should be:

- a. population density
- b. higher than average residential prices
- c. presence of energy providers in the commercial and industrial sectors
- d. other demographic and economic variables should be the

Some Caveats

- a. We use “Energy Provider” and “Energy Marketer” synonymously, to mean new privately owned entrants that simply provide electricity sales, as opposed to those that provide fuller services, such as transportation, and distribution.[EP]
- b. We distinguish these suppliers from the traditional suppliers that may be fully vertically integrated, or provide either transmission and distribution services or both.
- c. We distinguish a third category of supplier, publicly owned utilities, which include Federal, Municipal, and Cooperative suppliers of electricity [FMC).

LITERATURE REVIEW

Since Christensen and Greene (1976) numerous articles have been written on the efficacy of the deregulation of electric power. Joskow and Schmalense (1983) have provided a significant review of the literature arguing for deregulation. Both Kaserman and Mayo (1990) and Lee (1995) have shown that vertical disintegration of electricity entails technology loss. Joskow (1997) has provided a more recent and succinct overview of the progress and problems of reform in the electric power sector. **Few studies have examined the determinants of the competitive entrance.** A few surveys have looked at switching at the micro-level or individual consumer choice level (Watson, A, 2000, et. Al.). Most have assumed markets, once opened up, will automatically attract new residential energy providers. Many studies have argued for more consumer choice, and market solutions to the residential electricity markets. White (1996) suggests a clear connection between the magnitude of the price-cost gap and a states deregulatory activity, and uses this to explain and forecast wide heterogeneity between states deregulatory progress. Joskow (1996) argues that in states such as California, and Northeastern states the price-cost differential between retail, and wholesale markets is the largest, and therefore these are the regions which have the largest potential benefits to deregulation. **In our paper we examine this price gap, as well as a number of other important determinants.** While these previous researchers have suggested hypotheses, few have empirically examined them. In this paper we will attempt to look at a number of the determinants by addressing these issues based upon a cross-sectional state-by-state study.

METHOD

In analyzing this problem of market share determinants we chose to use the method of Seemingly Unrelated Regression Equations, or SURE. SURE was chosen in order to take care of the contemporaneous cross-equation error correlations. Viewing only the ordinary least square regression results, the equations might seem unrelated. In fact, they may be related through the cross-correlations in the errors. It would be unrealistic to expect that the errors in the ordinary least squares regression equations are uncorrelated. The fact that the market share of one type of provider certainly impacts the market share of the other providers may cause this problem, and lead to non-robust standard errors. Clearly, market share data which sums to one when all competitors are included is susceptible to this problem. The fact that shares do sum to one causes problem, therefore, we use SURE and drop one set of market shares from the model. What we have done is run two SURE models. One in which we exclude the Investor Owned Utility or traditional suppliers, and use simply the publicly owned supplier residential market share, and the Energy provider residential market share. In the second model we include the IOU market share, and drop instead the publicly owned market share (Green, 2003). In addition to SURE, we create two instrumental variables in order to eliminate the possible endogeneity effect of price. We handle this by creating the instrumental variables of delta in the first model, where delta is the residual variable of the OLS regression of price on publicly owned market share, thus delta represented price cleaned of its causation between itself and the publicly owned market share effect. The variable Gamma was similarly used in the second model to take care of the same problem between price and traditional supplies market share.

DATA

The paper represents a cross-sectional study of the determinants of residential energy in the U.S. Our analysis included data from the 50 U.S. states and the District of Columbia. The study represented a cross-sectional analysis for the year 2001, the most recent year for which we had data. Various reports of the Energy Information

Administration were the source of all electric utility information (see www.eia.gov). All the state demographic and economic characteristics of states were obtained from the U.S. Census Bureau. (www.census.gov) Table I provides a summary of the final variables used in the analysis.

TABLE 1 IS ABOUT HERE

This data is based on the years 2000-2001. Many of the demographic variables are based on the Census 2000.

- A. The U.S. average of the overall market share held by energy providers is approximately 4.3%, with Maine, and California, having the largest percent 66.33%, and 28.7% respectively, of residential, commercial, and industrial electricity supplied by energy providers in 2001.
- B. Roughly thirty states had no residential electricity supplied by energy providers. The picture for the residential sector alone is much dimmer. As seen in table 1 the U.S. average residential percentage market share was .89%, while it ranged from zero in many states, to 35.51% in Maine. A question that we attempt to investigate in this paper is why there is such a disparity among the states.
- C. Population density is a measure of the size of the market in a state. The District of Columbia had the highest population density with 9316 people per sq. mile, and New Jersey was second with 1134 people per sq. mile.
- D. Our expectation regarding population density was that this variable would be positively associated with the residential market share of energy suppliers. The denser the population the more the likelihood that privatized residential electricity supply would be feasible from a marketing and efficiency standpoint, and the more likely a customer switching and bandwagon effect.
- E. Regarding the average revenue per kilowatt-hour variable our a priori expectations were that the higher this variable the higher the market share of revenues for energy providers. That is energy providers would be attracted to markets with high price-cost margins. Thus, we are using average price per kwhr as a proxy for the price-cost margin. This would reflect the idea that consumers paying more per kwhr basis would be more amenable to the selection of an alternative supplier. Indeed, this variable represented a proxy for residential price.

In terms of the percentage of residential electricity sales provided by public power facilities Nebraska leads all states with 100%.

RESULTS

In Table 3 the results of the SURE regression using the market shares of public ownership and energy providers as dependent variables, and dropping the equation of the investor own utility market share.

From these results we see that there does exist a scale impact for population density, for both equations population density and population density squared are statistically significant and have signs of negative and positive respectively. This indicates that there are scales economies associated with density of markets. Average household size while having the same sign in both equations was statistically significant only in the energy provider equation. The negative sign indicates that larger households in a state are less like to attract energy providers. Viewing Table 2, we see that average household size is negatively and statistically significantly related to both population density, and population density square. This indicates that average household size is larger in less densely populated rural areas. This provides a further confirmation of the importance of population density as a measure of market potential. The price variables delta in the publicly owned model, and the variable Price in the energy provider model both had a positive sign indicating that higher price attracted both public ownership and energy provider entrance, however the delta was not statistically significant; indicating that price had little influence on publicly owned enterprise market share. Finally, we find that the variable EPNRMS was statistically significant and positively related to energy provider residential market share indicates that an already existing presence of energy providers in other segments of the market attracts energy providers; this provides evidence of economies of scope in these dense markets. Table 4 contains the results of our second set of seemingly unrelated regression models. The results in this table are quite similar in all respects except for slightly higher R-squares, and Z values. While in the first model we found market share of energy providers to be positive related to price, and publicly owned not significant in this second set of models we find price to be not statistically significantly related to market share. Again this is to be expected, high prices in a market should attract more

competitors and therefore lower the market share of energy providers. The fact that the results were almost identical confirms the notion that it does not matter which of the equations we drop from the model⁶³.

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CONCLUDING REMARKS

In this paper we investigated the factors that determine the residential share of energy provider. Our results indicate that energy provider market share is positively related to price of electricity in the state.

That is, higher electricity prices in a state attract energy providers. Somehow, electricity prices are treated as indicators of inefficient cost and pricing structures of the dominant existing utility company.

Second, major attractor is existence of economies scale reflected by higher population densities. We found that energy provider residential market share is positively related to population density.

Thirdly, we find that the presence of energy providers in the commercial and industrial sector in the state also positively impacts the market share energy providers in the residential sector. This last factor may be interpreted as a proxy of the existence of economies of scope.

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APPENDIX

A. VARIABLE DESCRIPTION

DESCRIPTION OF VARIABLES
FMCRRMS - represents the residential electricity market share in a state of Federal, Cooperative, and Municipal suppliers.
Popdensity - the population density of the state.
Popdenssq - the square of the population density of the state.
Delta : Instrumental used for price. We first regressed price against FMCRRMS and delta is the residual of that regression
Avgghsize -represents the average size of households in the state.
EPRMS -represents the percentage residential market share in a state held by energy providers.
EPNRMS – represents the non-residential market share (Commercial and Industrial) of energy providers.
Price : Average residential price per kwhr in nominal values.
TSRMS -represents the residential electric market share of traditional full service providers, or Investor Owned Utilities.
Gamma - Instrumental used for price. We first regressed price against TSRMS and delta is the residual of that regression

Table 1: Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
FMC RMS	51	42.072	31.923	0.00	100.00
Popdensity	51	361.092	1302.833	1.10	9316.40
Popdensq	51	1794478	12100000	1.21	86800000
Delta	51	0.000	1.973	-3.67	6.67
Avghhsize	51	2.554	0.146	2.16	3.13
EPRMS	51	0.891	5.009	0.00	35.51

Table 3: Seemingly unrelated regression

Equation	Observations	RMSE	R-sq	chi2	N
EPNRMS	51	0.029	0.066	0.00	0.29
Price	51	8.366	2.332	5.13	16.41
TSRMS	51	57.037	31.329	0	100
Dependent Variables	51	0.000	2.021	-3.674	6.706
Gamma					
FMC RMS		26.91762	0.2748	19.33	51
EPRMS		3.679542	0.4497	41.74	51

	Coef.	Std. Err.	z	P>z
FMC RMS				
Popdensity	-0.070	0.017	-4.060	0.000
Popdensq	0.000	0.000	3.690	0.000
Delta	1.114	2.039	0.550	0.585
Avghhsize	-10.643	29.148	-0.370	0.715
Constant	82.284	74.877	1.100	0.272
EPRMS				
EPNRMS	41.075	8.370	4.910	0.000

Popdensity	-0.005	0.003	-2.050	0.040
Popdensq	0.000	0.000	1.800	0.073
Price	0.531	0.264	2.010	0.044
Avghhsize	-8.102	4.008	-2.020	0.043
Constant	16.978	9.966	1.700	0.088

Table 4: Investor owned and energy provider market shares

Equation	RMSE	"R-sq"	chi2	N
TSRMS	25.94	0.30	21.89	51
EPRMS	3.69	0.45	46.95	51
	Coef.	Std. Err.	z	P> z
TSRMS				
Popdensity	0.072	0.017	4.300	0.000
Popdensq	0.000	0.000	-3.890	0.000
Gamma	-1.222	1.903	-0.640	0.521
Avghhsize	17.786	27.937	0.640	0.524
Constant	-1.747	71.760	-0.020	0.981
EPRMS				
EPNRMS	41.967	8.291	5.060	0.000
Popdensity	-0.006	0.003	-2.230	0.025
Popdensq	0.000	0.000	1.970	0.049
Avghhsize	-8.466	4.007	-2.110	0.035

Price	0.635	0.263	2.410	0.016
Constant	17.097	9.966	1.720	0.086

Effect of TQM on Customer Satisfaction in Indian Manufacturing Industry

Jha, U.C¹ & Sunand Kumar²

¹ Ph.D Scholar, Department of Mechanical Engg., National Institute of Technology, Hamirpur(HP). Email: jha.udai@gmail.com

²Department of Mechanical Engg., National Institute of Technology, Hamirpur(HP)

ABSTRACT

This research presents new data and insights into the relationship between TQM implementation and customer satisfaction. The main purpose of this research is to determine the impact of TQM implementation on customer satisfaction in the context of Indian manufacturing industries.

Keywords : TQM, Review, Organizational, Literature

1. INTRODUCTION

1.1 Total Quality Management (TQM)

Total Quality Management (TQM) refers to management methods used to enhance quality and productivity in organizations, particularly businesses. TQM is a comprehensive system approach that works horizontally across an organization, involving all departments and employees and extending backward and forward to include both suppliers and clients/customers.

1.2 TQM Principles

Specifics related to the framework and implementation of TQM vary between different management professionals and TQM program facilitators, and the passage of time has inevitably brought changes in TQM emphases and language. But all TQM philosophies share common threads that emphasize quality, teamwork, and proactive philosophies of management and process improvement. As Howard Weiss and Mark Gershon observed in *Production and Operations Management*, "the terms quality management, quality control, and quality assurance often are used interchangeably. Regardless of the term used within any business, this function is directly responsible for the continual evaluation of the effectiveness of the total quality system." They go on to delineate the basic elements of total quality management as expounded by the American Society for Quality Control: 1) policy, planning, and administration; 2) product design and design change control; 3) control of purchased material; 4) production quality control; 5) user contact and field performance; 6) corrective action; and 7) employee selection, training, and motivation.

1.3 Making TQM Work

Joseph Jablonski, author of *Implementing TQM*, identified three characteristics necessary for TQM to succeed within an organization: participative management; continuous process improvement; and the utilization of teams. Participative management refers to the intimate involvement of all members of a company in the management process, thus de-emphasizing traditional top-down management methods. In other words, managers set policies and make key decisions only with the input and guidance of the subordinates that will have to implement and adhere to the directives. This technique improves upper management's grasp of operations and, more importantly, is an important motivator

for workers who begin to feel like they have control and ownership of the process in which they participate.

Continuous process improvement, the second characteristic, entails the recognition of small, incremental gains toward the goal of total quality. Large gains are accomplished by small, sustainable improvements over a long term. This concept necessitates a long-term approach by managers and the willingness to invest in the present for benefits that manifest themselves in the future. A corollary of continuous improvement is that workers and management develop an appreciation for, and confidence in, TQM over a period of time.

Teamwork, the third necessary ingredient for the success of TQM, involves the organization of cross-functional teams within the company. This multidisciplinary team approach helps workers to share knowledge, identify problems and opportunities, derive a comprehensive understanding of their role in the over-all process, and align their work goals with those of the organization.

Jablonski also identified six attributes of successful TQM programs:

Customer focus (includes internal customers such as other departments and coworkers as well as external customers) Process focus Prevention versus inspection (development of a process that incorporates quality during production, rather than a process that attempts to achieve quality through inspection after resources have already been consumed to produce the good or service) Employee empowerment and compensation Fact-based decision making Receptiveness to feedback.

2.0 Customer satisfaction

Customer satisfaction has recently drawn much more attention than ever before. According to Fornell (1992), not only do many firms continually monitor customer satisfaction at the firm level, but some countries also make the effort to measure customer satisfaction on a nationwide basis (e.g., Sweden, US, Japan, Singapore, and EC countries). Customer satisfaction should be one of firms' key performance measures (Naumann and Giel, 1995). The attainment and maintenance of satisfactory levels of customer satisfaction is today fundamental determination for business health, growth, and economic viability (Feigenbaum, 1991). The Malcolm Baldrige National Quality Award (1999), a case in point, considers customer-focused results the most important. For the European Quality Award (1994), customer satisfaction is the most important in terms of points assigned. According to Fornell et al. (1996), customer satisfaction is a new type of market-based performance measure for firms. It provides an important measure of the firm's past and current performance, as well as future financial health. Customer satisfaction represents a new means of evaluating performance for the modern firm and the modern economy. Marketing scholars and practitioners have long recognized that customer satisfaction is an important and central concept, as well as an important goal of all business activities. Dean and Bowen (1994) believed that customer satisfaction to be the most important requirement for long-term organizational success. In fact, a firm can exist because the firm has customers; it is very clear that no customer means no business.

3.0 Research Methodology

There were four main steps in the methodology used in our research study:

1. Choosing the appropriate performance measures.
2. Gathering a sample of organizations that have effectively implemented TQM.
3. Developing a questionnaire and distributing it to the selected organizations.
4. Empirical analysis of data obtained, to find the impact of TQM on organizational performance.

Any attempt to establish the link between TQM and organizational performance must focus on firms that have implemented TQM effectively. This is important because while most firms will claim that they have implemented TQM, few are doing it effectively. Including non-effective implementers will obscure the impact of TQM. Effectively implementation means that the key principles of TQM such as focus on customer satisfaction, employee involvement, and continuous improvement are well accepted, practiced, and deployed within the firm.

We used the ISO 9000 : 2000 certified company as a proxy for effective implementation of TQM. A review of ISO 9000 : 2000 criteria confirmed that the core concepts and values emphasized are those that are widely considered to be

the building blocks of effective TQM implementations. ISO 9000 : 2000 certifications are given after the applicant goes through a multi-level evaluation process where internal or external experts judge the applicant.

A questionnaire survey was developed and distributed. The empirical data were obtained from a survey of award winning Indian manufacturing industry. The responses of questionnaire survey were analyzed using a multiple regression technique. The reliability and validity (construct, content, criterion) of the practice and performance measures were evaluated. Confirmatory factor analysis is used to test the psychometric properties of the measurement scales and the hypothesized relationship between TQM practices and firm's performance are examined using structural equation modeling.

Also we present evidence on the financial results that publicly traded organizations have achieved from implementing TQM effectively. Financial results are measured using variables such as stock returns, operating income, sales and costs.

4.0 Analysis

4.1.1 Reliability Analysis

Cronbach alpha is a measure for the internal consistency of the items, that together covers the specific (new and underlying) factor. In general, a value of 0.60 is acceptable.

Table 6.1

S. No..	Item	Cronbach Alpha
1.	Customer Focus	0.62
2.	Communication	0.63
3.	Delegation	0.69
4.	Continuous Improvement	0.64
5.	Results & recognition	0.63
6.	Leadership	0.64
7.	Process Improvement	0.67
8.	Supplier Focus	0.64
9.	Team Work	0.65
10.	Value & Ethics	0.67
11.	Work Culture	0.64
12.	Strategy	0.66

All our factors has Cronbach alpha value above 0.60 which shows the internal consistency of items.

6.2 Correlation Analysis

6.2.2 Correlation between TQM Constructs and Results (Clients')

Table 6.4

S. No..	Item	Correlations
1.	Customer Focus	0.79***
2.	Communication	0.35**
3.	Delegation	0.69***
4.	Continuous Improvement	0.47***
5.	Results & recognition	0.82***
6.	Leadership	0.64***
7.	Process Improvement	0.42**
8.	Supplier Focus	0.80***
9.	Team Work	0.52***
10.	Value & Ethics	0.58***
11.	Work Culture	0.54***
12.	Strategy	0.54***

*p < 0.05, **p < 0.01, ***p < 0.001

5.0 CONCLUSION

TQM can be a powerful technique for unleashing employee creativity and potential, reducing bureaucracy and costs, and improving service to clients and the community. TQM is focused on quality, presumably a concern of both management and workers, and methods improvements should eliminate wasteful bureaucratic activities, save money, and make more human resources available for core activities, specifically client service.

It is concluded from this analysis that high scores on TQM constructs [e.g Customer Focus, Delegation, Results & Recognition and supplier focus] leads to high scores on customer satisfaction.

In order to make TQM yet a successful venture and transfigure the organization into a 'whole' one, the following action points are proposed:

- * Organize customers' surveys and communicate the voice of customers to all employees through interaction.
- * Understanding and acting upon customer perceptions can help drive heightened performance of an organization at all levels.

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Prof. U. C. Jha

Currently Prof. Jha is working as **Professor** of Mechanical engg. department at “Kanpur Institute of Technology”, India. Prof. Jha is a former **Director** of CII Technology Centre and **In charge – Entrepreneurship Development Cell**. He has also served as the **head of the Department, Dean (Exam.) and “Acting Director”** of an engineering college.

His outstanding achievements have earned him a position in “**Marquis Who's Who in the World**”, **26th Anniversary Edition, 2009**, which is a prestigious international publication of the most noteworthy individuals in their respective field and careers around the globe.

He has received Certificate of Participation from **NASA, USA**(for LRO”Send your Name to the Moon” Project) .He has been selected for “**International Profiles of Accomplished Leaders**” & “**Man of the year representing India 2008**” (American Bib. Society, USA).

He has around 14 years of teaching, research, consultancy & industrial experience and has published & presented **over 60(Sixty) papers** at International / National conferences & journals. He is in the **Editorial Advisory Board** of **Journal of Management Development (Emerald, UK), Journal of Technology Management & Innovation (Chile, South America) & in Editorial Review Board** of **Journal of Information, Knowledge & Management (USA)** . He is in the **Board of Governors** of Samarjit Jeevan Education Trust. He is also **reviewing** *Contemporary Management Research International Journal (Taiwan),International Journal of Productivity & performance management (Emerald,UK), International Journal of Knowledge Management(USA), International Journal of Innovation & Technology Management(World Scientific,UK) & International Journal of Six Sigma & Competitive Advantage (UK) & Journal of Intelligent manufacturing (Springer – Netherlands)*.

Some of his paper has been published by **International Journal of Mathematical Modeling, Simulation & Application, Oxford University (UK), Harvard University (USA), Cambridge University (UK), University of Bremen (Germany), University Karlsruhe (Germany), Utrecht University(Netherlands), University of Ipoh (Malaysia), Kolej University (Malaysia), University of Technology (Jamaica), , Global academy for Business & Economic Research (Bangkok), Academy of Taiwan Information System Research (ATISR) etc.**

He has been a *visiting faculty* at various universities in India and *delivered lectures & provided consultancy* to various organizations like *L&T, Eicher Motors, Voltas, Blue Star, ETA, ARP Ltd., Eagle Seeds, Hindustan Syringes etc.* He is the member of various professional society like IAPQR, IMA, ISME, GABER (USA), ASCET (USA), ISCM(USA), IAENG(Hongkong), WASET(France) etc.

Prof. Jha has *an outstanding academic record (recipient of National Merit Scholarship) and he is most loved & respected teacher with excellent teaching track record.* He has guided more than 20 undergraduate and postgraduate projects. He has taught a wide spectrum of subjects related to Mechanical Engg., Production/Operation Management, Supply Chain Management, Total Quality Management, Knowledge Management, Operation Research, Industrial Engg.etc.

His area of interest is Mechanical Engg., TQM & ISO 9001, Supply Chain Management, Six - Sigma, International Competitiveness, Quality management, Knowledge Management, Operation Management & Operation Research , Industrial engg., Entrepreneurship development etc.

Email :- uc_jha@yahoo.com , Mobile – (91)9935661

An empirical study on investors' perception towards Nifty Stock index future market with reference to Indore City, India

Sumeet Khurana, Professor, MAT Campus, Ralamandal, Indore, India
P K Gupta, Professor, IMS, Devi Ahilya University, Indore, India
Pankaj Trivedi, Controller- VYAPM, Govt. of M.P, Bhopal, India
Kamal Nayan Agarwal, Associate Professor, Howard University, USA

Abstract

Present study has been aimed at studying the investor's perception towards Stock index future market in India which started with a average turnover of Rs. 2365 crore in year 2000 reaching to an average turnover of Rs. 1022362.13 in the year 2013. A sample of 506 respondents from Indore City were administered A questionnaire with 5 point response categories developed with 21 components related to nifty index future trading out of 55 components selected using dimension reduction technique. In all six factors emerged in the study using Principal component analysis with Varimax rotation.

Key words: Nifty, Stock index future, hedging, speculation, arbitrage.

Introduction

In India, Index future trading started in June 2000 with an turnover of Rs. 2365 crore in year 2000 reaching to remarkable turnover of Rs. 1022362.13 in the year 2013, equaled or exceeded many other regional markets (Sarkar, Asani -2006). Thomas, Susan & Shah, Ajay (2005) stated that India is one of the most successful developing countries in terms of a vibrant market for exchange-traded derivatives. Borse, Deutsche (2008) highlighted that no other class of financial instruments has experienced as much development and innovation.

The growth of Indian derivative market is being propelled mostly by retail investors, private sector institutions and large corporations. In a slow pace of development other participants are also showing increased interest now. The growth in derivatives especially index future is boosting Foreign brokers presence in Indian market. But the purpose of trading for any of the trader can be for Hedging, speculation or Hedging (Hull John C, 1992), and it has been stated in various researches that introduction of derivative trade especially index futures have contributed in various ways to the economy(Thakur, Anuj Krkun & Kalra, Sameer-2002) as follows-



Fig. 1: Advantages of financial derivative in economy

Rationale of the study

In order to develop appropriate regulatory framework for derivatives trading Government of India constituted L C Gupta Committee (LCGC) 1996 which suggested that index derivative in India should be set up for portfolio hedging purpose as they being most cost efficient hedging device cannot be easily manipulated, are more liquid, more popular and favorable than individual stock futures there is always clearing house guarantee and have minimum regulatory complexity. Accepting the recommendation the derivative trade in India started with the introduction of Stock Index future contract in 2000 and has seen **very high** growth since then. This unprecedented growth makes it necessary to understand the perception of retail investors towards the index future market and analyze their awareness level

Literature review

Increased financial risk has been responsible for the development and growth of derivative market as it provides less costly solution to the problem of risk (Vashistha, Ashutosh-2010). For hedging i.e. avoiding risk which is omnipresent (Rao, SVD Nageswara & Kumar Sanjay -2004) hedging can be motivated only by *the desire to reduce risk* and a proper hedging strategy should be followed using derivative instrument (Naik, Narayan Y & Yadav, Pradeep K.-2000) which can be observed from dealers activity as they use derivatives to hedge their spot risk exposure specially when the market is more volatile, when spot risk exposure is high, and when the cost of hedging is low most of the time.

Financial derivatives are products whose price is linked with that of an underlying asset (Bose, Suchismita-2006) and any mispricing may open a gate for arbitrageurs. But by the introduction of index future trading the volatility of underlying asset has reduced and it has also improved the price discovery effect making the market more efficient (Mall, Manmohan -2011) and less open to arbitrageurs (Savona, Paolo Aurelio Maccario & Oldani Chiara-2004). Indian market also shows similar results (Nupur Hetamasaria and Saikat Sovam Deb-2004) of reduction in volatility of nifty after the introduction of stock index futures. Further the liquidity of the underlying asset's market also increased.

Research Gap

Most of the studies done in financial derivative market, especially index future market have been discussing about various critical issues as can be seen from the following figure-

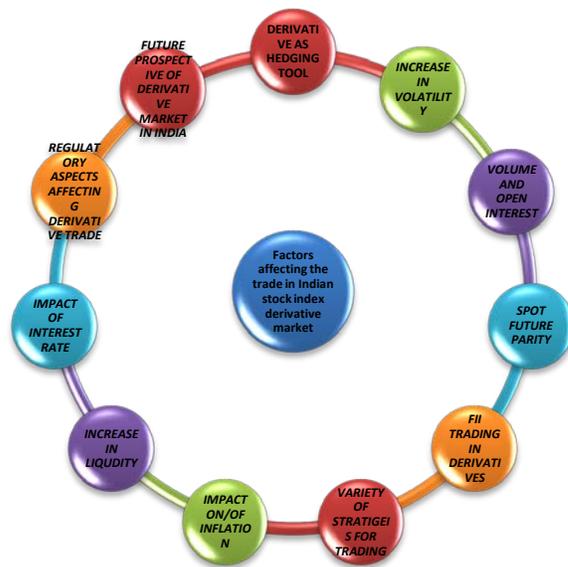


Figure 1.3: Various issues discussed in literature review

A gap has been identified in the literature review to study the perception of an individual investor towards index future market or financial derivative market as a whole from the retail investors point of view.

Research objective

To study the investors' perception towards Nifty Stock index future market with special reference to investors of Indore City.

Research methodology

A number of issues based on literature review have been identified for the study which have been classified into four major groups:

- a. Profile of clients dealing in derivative securities.
- b. Different purposes for which the investors are using index future contracts.
- c. Issues concerning the derivative trading and
- d. Finding out various factors affecting index future trading

In order to the investors' perception a 5-point Likert type questionnaire was developed Initially 55 components related to research questions were included in the questionnaire which was pre-tested on a group of 25 investors and experts. Data obtained was subjected to analysis using dimension reduction technique. The analysis yield only 21 components for inclusion in the final questionnaire. The Cronbach- alpha reliability was calculated for the final questionnaire which comes out to be 0.704.

Sample Size

In order to study the perception of retail investors towards Nifty future trading convenience sampling technique was used. A total of 600 questionnaires were received of which only 506 questionnaire were found to be complete in all respect and were included for the analysis. The distribution of the respondents was as under:

Age group	20-30 years 68%	31-40 years 18%	41-50 years 9%	Above 50 years 5%
Gender	91% males	Marital status	55% married	
Income level	~ Rs.4 lacs 73%	Rs. 4.1 – 8 lacs 22%	Above 8 lacs 5%	
Education level	PG/Professional 82%	Under graduate 18%		
Yearly investment	Upto Rs.1 lacs 68%	Above 1 to Rs.2 lacs 23%	Above 3 lacs 9%	
Investment decisions/mentors	Self – 77%	Brokers-9%	Friends /relatives 5%	Other agencies 9%
Major Sources of information	Newspaper- 32%	TV 18%	Internet intermediaries 50%	

Analysis

Data obtained was subjected to the Principal Component analysis with varimax rotation. On any component the factor loading of 0.5 or above irrespective of its sign was considered contributing significantly to a factor (Factor Loadings are shown in Table 1). Six factors emerged from the analysis. The identified factors are:

TABLE - 1

Rotated Component Matrix						
	Component with 0.5 and above					
	Pricing Factor	Awareness Factor	Volatility Factor	Risk Factor	Derivative Factor	Investment Factor
Awareness of index trading	.369	.565	.068	.060	.093	.230
Mark to market	.002	.866	.169	.200	-.093	.092
Arbitrage gain	.020	.808	.005	-.180	.219	.124
Convenience of trade	.172	.831	.003	.159	-.035	-.358

Interest rate	.753	.165	.221	-.045	.388	-.145
Duration of contract	.706	.415	.403	-.091	.103	.121
FII movement	.845	-.161	.168	.297	-.182	-.030
Volume of contract	.832	.165	-.179	-.137	-.018	.030
Dividend yield	.391	.140	.774	.218	-.126	.336
Price discovery	-.149	.065	.786	-.262	.367	.143
Volatility of market	-.189	-.053	-.845	.043	-.183	.308
Hedging purpose	-.104	.126	.389	-.678	.051	-.085
Speculation purpose	.153	-.388	-.261	-.777	.188	.119
Govt. policies	.314	-.001	-.186	.780	.191	-.092
MF participation	-.174	.089	.068	.763	.019	-.007
Transaction cost	-.050	-.211	-.141	.126	.867	.021
Spot movement	.268	.200	.362	-.073	.565	-.133
Foreign market movement	-.158	.115	.295	-.192	.702	.264
Factors affecting Spot	.314	.343	.256	.148	.610	-.067
Individual income	.099	-.046	.133	.101	.023	.888
IPO introduction	-.169	.241	-.277	-.388	.078	.770

1. Awareness factor

The investors reported their awareness about index trading and the concept of mark to market. Respondents also understand that the returns are guaranteed if there is arbitrage opportunity through index trading. Their knowledge about index trading made it most **convenient** derivative instrument for trade. The factor is contributed by Awareness of index trading (0.565), mark to market (0.866), arbitrage gains (0.808), and convenience (0.831) with the given load. This factor is confirmed from the findings of Asani Sarkar (2006) which states that in terms of the growth of derivatives markets, and the variety of derivatives users, the Indian market has equaled or exceeded many other regional markets.

2. Risk factor

Investors when asked about their view towards hedging and speculation using index future contract. Investors' view about government policies and mutual funds and their impact on movement of index future was also been

analyzed. This factor was contributed by hedging (-0.678), government policies (0.780), mutual fund participation (0.763), and speculation (-0.777).

According to Edward (Franklin R Edward 1999), increase in volatility of the market is due to various reasons but the major one is the speculative activities. The study reveals that Indian stock index future market is witnessing huge amount of speculative activities rather than hedging activities. Speculators also predict Government policies and mutual fund participation to forecasts the movement of index and index future. Although a very interesting fact came out of the study is that in Indore investors do not admit that they trade for speculation purpose, may be because of social/cultural issues related with them. This factor is in line with the Hull's classification of investors into Speculators, Hedgers and Arbitraders.

3. Derivative factor

The study reveals that factors affecting underlying also affect the derivative. Respondents in this study opined affirmatively to the fact that all those factors which affect nifty also affect nifty futures. The important items contributing towards this factor are transaction cost (0.867), spot market movement (0.565), foreign market movement (0.702) and factors affecting spot market (0.610). Suchismita Bose(2005) found that there is significant information flow from the futures to the spot market and futures prices and as a result any factor which is affecting the spot market is affecting the future market also which supports this study as well. Present finding are in agreement with the argument of GulserMeriç., NiranjanPati and IlhanMeriç in their study of co-movements of the Indian stock market with other stock markets found that most of the stock markets of the world are highly correlated with Indian stock market

Further, transaction cost of index trading is also being perceived to be quite high by the investors. And most of the regulatory bodies also believe to be working on the same formula and try to reduce the transaction cost as and when possible to make the market more idealistic.

4. Pricing factor

Interest rate (0.753), duration of the contract (0.706), FIIs movement (0.845), open interest and volume of the contract (0.832) have emerged with high loading on this factor, which is named as Pricing Factor. The theoretical base of future pricing is cost of carry model which implies that the major variable affecting the future price would be the current spot price, interest rate in the market, transaction cost, dividend yield and duration of the contract. This study also suggests the same that the price of the future contract is dependent on the interest rate and the duration of the contract.

This research also explores that the change in trading volume and the open interest i.e. number of outstanding contracts also affects the future price and its movement. Movement of FIIs in Indian stock market is the major source of movement of nifty. The changes in demand and supply and thus the changes in stock price is mainly due to these foreign institutional investors. Their movement is affecting spot price and thus future price also as suggested by Karpoff (1987).

5. Investment factor

The fifth factor named as Investment Factor is contributed by high factor loadings on impact of income on the index trading (0.888), introduction of IPOs on the movement of future index (0.770) indicate that most of the investors in Nifty future market trade for speculation purpose. This results into the conclusion that higher the income of an individual higher would be his risk bearing capacity as compare to low income group investor. As a

result we can say that the income of an individual plays a vital role for participation in index future market. The amount of fund invested in the market is directly proportion to surplus income of an investor.

Investment is the economic term which suggests that the surplus income is mobilized for development. This development could be through the stock market as well which provides maturity intermediation for the investors who are investing in the companies directly via initial public offer i.e. IPO. Good fundamentals like positive economic growth, industry demand, introduction of newer versions of technical goods, optimistic investor approach etc. are acting as motivating factors for the companies bringing IPOs.

6. Volatility factor

Financial institutions are responsible for increasing the volatility of the market (-0.845), spot market helps in price discovery of index (0.786) and dividend yield affect pricing of future index (0.774) are the major variables determining volatility factor.

Bulk trading in market whether buying or selling affects the movement of the market along with the sentiments of the investors. Financial institutions are the bulk buyer and seller in the market but this research says that they have a negative impact on the volatility of the market.

Dividend yield is one of the major components which are being used for calculating the fair value of future contract. Any information regarding the dividend or any expectation of companies dividend would naturally put a great impact on the movement of future price of index. This study also supports the same argument.

Apart from this other important outcomes of the study are as follows:

1. Regarding the matter of high lot size of index future trading at NSE there was a typical outcome from the study. Half of the respondents believe it to be high and half of them believe to disagree on the above statement and rest is neutral.
2. Investors believe that there is lack of advisors in Indian derivative market. And the study says that only 36% of investors are able to attain their investment objectives through derivative trading.
3. Huge growth in derivative market of India and specially Index future market is because of globalization, increased volatility in asset prices and growing technology & communication facilities, this is what is the common believe in all the investors according to the study.
4. Investors also believe that Indian financial derivative market is a well-developed market and big and institutional investors use stock index future contract as a portfolio management tool.
5. The participation in derivative market depends on variety of reasons viz. market condition, costs and services involved in trading, education and awareness of the investors. Apart from this media can play an important role for educating the retail investors. Investor's protection, developed product and improved market quality can also help in improving the quality of participation in index trading market.
6. Enhancing confidence and knowledge among investors and brokers would further bring a purposeful and learned trading pattern of investment.

7. Better trained contact persons for helping the investors to invest in derivative market apart from brokers can be added advantage. If awareness of proper hedging techniques using index future contract can be widespread then we may have enough number of hedgers too in index future market.
8. Indian market has been witnessing evidence of increased speculation resulting upon the introduction of derivative trading. Mainly, the stock futures are being perceived as the tool for speculation as they are leveraged. Although the need of introduction of derivative was for hedging.

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Service Failure Recovery and Competitive Positioning: A Case of Mobile Telephony

Hart O. Awa, Ph.D
University of Port Harcourt, Port Harcourt, Nigeria
awa.hartouph@yahoo.com

Ogwo E. Ogwo, Ph.D
Abia State University, Uturu, Nigeria
ogwoekeogwo@hotmail.com

Ojiabo Ukoha, Ph.D
University of Maryland Eastern Shore, U.S.A
oukoha@umes.edu

ABSTRACT

This study attempts to validate and cross-validate the causal relationships between four dimensions of service recovery and competitive positioning under the moderating influence of firm's size. Questionnaire was administered amongst full-time teachers of Federal Government Colleges (295 copies) and senior officers (134 copies) of telecommunications firms in the south-eastern Nigeria, where GSM and at least one CDMA firm have network coverage. The data collection instruments were subjected to Cronbach test, whereupon all the variables surpassed Nunnally's benchmark of 0.7. Analyzing the data using ANOVA, Pearson's product moment correlation coefficient, multiple regressions, and partial correlations, the interactions between the four recovery alternatives and competitive positioning were statistically significant. While such correlations were significantly moderated by firm's size; facilitation was the most critical, followed by timeliness, redress, and user collaboration, which though still critical but inversely related to competitive positioning. The paper advices on proactive and relational recovery and specifically recommends simple and hassle-free recovery, timely and value-creating redress, and realistic user interface.

Keywords- service recovery; competitive positioning; mobile telephony.

Introduction

The vast adoption of telecommunications facilities attracts global revolutionary changes (Cook, 2008), and confirms Thomas Friedman's *the world is flat* (Israel, 2007). Specifically, mobile telephony plays a vital socio-economic role (Gabriela and Badii, 2010) with subscriptions growing from less a billion worldwide in 2001 to more than 5 billion in 2010 (Kelly, 2009; Rebello, 2010) and developing economies taking giant strides (Mokhlis and Yaakop, 2011). The industry worth \$1.1 billion in 2002 and since then, it has experienced an annual growth of at least 37 percent driven predominantly by explosive adoption of mobile telephony (Wills, 2003; Comer and Wikle, 2008). Mobile service providers in Nigeria offer N600 billion annually to federal government's coffers; provide employments to over 3 million Nigerians (Uzor, 2011; Okeleke, 2011); and attract cost reduction and improved customer service, transparency and real-time knowledge sharing, foreign investments and globalization, and indigenous skill acquisition (see Davenport and Brooks, 2004; de Burca *et al.*, 2005). On the average, investment runs over \$50 billion (Okeleke, 2011) and revenue rose above \$11 billion in 2010; almost double the 2009 record (Paul *et al.*, 2010).

However, different Global Systems for Mobile Communications (GSM) (e.g., MTN, M-tel, Bharti Air-tel, Glo, and Etisalat); and Code Multiple Division Access (CMDA) (e.g., Zoom, Visafone, Multi-links, and Starcomms) operators of unequal market strengths are simultaneously involved in mobile telephony and internet services. The 2009 user experience survey broke-down the market strength of operators- MTN 46.19 percent, Glo 26.87 percent,

Bharti Air-tel 24.74 percent, Etisalat 1.76 percent, M-tel 0.44 percent and Visafone, Multi-links and Starcomms yet to be properly defined perhaps because they are relatively new entrants (Paul *et al.*, 2010). Managing service quality amidst stiff competition and increasing recognition for user-developer interface in this industry is premised on the inevitability of service failures, government's legislation to enforce corporate responsibility, and the need to drive profitability through customer loyalty (see Sajtos *et al.*, 2010; Slater, 2008). Unavoidably, operators have begun to appreciate service recovery as a critical managerial issue that co-exists with learning from post-consumption experiences and quality performance. This is because purchase behaviours are associated with functional, social and/or psychological expectations and so, when actual performance of a network falls short of these perceived ideals, inequity and of course service failures result. The affected consumer expects justice and fairness from the recovery team, or takes actions (public and/or private) against the provider in order to restore harmony in his cognition.

Therefore, recovery is repositioning customer values via difficult-to-copy distinctiveness. Scholarly accounts show that recovery rebuilds goodwill, customer satisfaction, trust, commitment, and employee morale (Michel *et al.*, 2009), production runs (Edmondson, 2011), corporate image (Cranage, 2004; Gonzalez *et al.*, 2010), word-of-mouth publicity (Kim *et al.*, 2009), repurchase intentions (East *et al.*, 2007; Davidow, 2003) and accounts for almost 60 percent of the critical behaviours of service providers, of which 45 percent solely accounts for customer switching (Keaveney, 1995). Previous (e.g., Smith *et al.*, 2009; del Rio-Lanza *et al.*, 2009; Kim *et al.*, 2009) studies on organizational response to customer complaints seem to have neglected the construct of user collaboration. Further, whereas most of the studies used customer satisfaction (see Bitner *et al.*, 1990; Smith *et al.*, 1999) and post-complaint behaviour (see Davidow, 2003) as major dependent variables, rarely did any attempted correlating recovery alternatives with competitive positioning.

These neglects seem serious and stimulate this inquiry on accounts that the neo-Marxists, Kotlerite' doctrine, post-Fordism, Foucault's notion of government, Finnish Consumer Policy Programmes, post-Maussian and even the earlier political philosophers (e.g., Jean Jacques Rousseau and John Locke) espoused cognitive and behavioural change emphasizing interface in resolving customers' issues. The issue of competitive positioning is necessary in this new marketing era, where firms use knowledge capital more than traditional resources to build customer-endorsed and difficult-to-copy manoeuvrability. Therefore, the knowledge contribution of this study focuses specifically on departing from these neglects and cross-validating the effects of facilitation, redress, and user collaboration on competitive positioning while observing the moderating effect of firm's size.

Conceptual Framework

a. Service Failure Recovery (SFR)

Every consumption is associated with subjective pre-purchase beliefs (shaped by Bass model; see Mahajan *et al.*, 1990) about a service, which serve as references against which performance is judged (Zeithaml *et al.*, 1993). Such differential expectations explain why industry players offer different services and still remain competitive. Studies (Brown *et al.*, 1996; Andreassen, 2001) suggest that nothing pleases a customer more than a reliable, first-time and error-free service; whereas some others (Michel *et al.*, 2009; Smith *et al.*, 2009) assume that the inevitability of errors triggers recovery effort(s) to compensate the affected customer in a manner at least equal to his perceived ordeals. Service failures abound, especially in the telecommunications industry where Momo (2012) reported that Nigeria's leading Opinion Polling and Research Organization in partnership with The Gallup Organization (USA) found that 64% of mobile phone users use more than one line in order to circumvent network failures.

Therefore, service recovery defines a firm's second chance to deal with perceived service failures (East *et al.*, 2007; Smith *et al.*, 2009), to promote customer retention and to dissuade switching behaviour, sharing of ugly experiences, or even challenging the firm through consumer rights organizations, activists, or legal systems (Sajtos *et al.*, 2010; Zeithaml and Bitner, 2000). Hart *et al.* (1990) define service recovery as strategies used to resolve and to learn from service failures in order to (re)establish reliability and trust in the eyes of consumers. It limits the harms of a service failure rather than impressing the customer when something has gone wrong (Michel *et al.*, 2009; Gonzalez *et al.*, 2010; Kim *et al.*, 2009). Further, service recovery is a managerial action aimed not only at resolving the problems that caused the service failures (Michel, 2001; Smith *et al.*, 2009) but also at seeking out, dealing with, and learning from, perceived service failures (Tax *et al.*, 1998; Slater, 2008) even when they are not reported (Kim *et al.*, 2009).

The salient point raised is proactive recovery, which indeed is informed by studies (Smith *et al.*, 2009; Hoffman *et al.*, 1995) showing that only a minority of disgusted customers actually complains and that most recoveries do not lead to customer satisfaction. Non-complainants are discouraged by the emotional stress, anger, and disappointment of previous recovery experiences; they deny operators the opportunity to learning from the lessons and experiences of handling such failures (Edmondson, 2011; East *et al.*, 2007) and often pose economic burden since low employee morale (in extreme cases resignation) and poor corporate reputation may result as well as the affected consumers boycotting the product and spreading negative word-of-mouth (McGrath, 2011; Edmondson, 2011). Therefore, Lewis (1996) notes that resolving the problem(s) at the point of encounter minimizes negative outcomes of a service failure.

Further, the definitions connote that service failure is an antecedent of service recovery; a critical moment of truth intended to restore reputational strides (Berry and Parasuraman, 1991; East *et al.*, 2007). They imply service recovery as simply much broader and more proactive than complaint management though both focus on service failure encounter. While both base on provider's reaction to customer complaints, service recovery also addresses service failure on time before the customer deems it necessary to complain (Grewal *et al.*, 2009; Michel *et al.*, 2009) on accounts that Michel (2008) opines that it is only when the first opportunity to recover is missed that the customer complains. However, the strength of service recovery lies largely on the established relationship and the severity of the service failure. If the original service was really bad, even strong recovery may get the customers upset and/or discourage favourable likelihoods (Smith *et al.*, 2009; Zeithaml and Bitner, 2000). Scholars (de Rio-Lanza *et al.*, 2009; Kim *et al.*, 2009; Michel *et al.*, 2009) theorize that customers who have less commitment to a service provider tend to be more transaction-focused and expect immediate recovery when transactions fall short of their ideals; and those with strong commitment expect low recovery on accounts that continual relationship with a service provider may settle-out the ordeals and turn them even more satisfied with service performance after recovery.

The manner of response to service failures has the potential to reinforce loyalty, or to exacerbate the situation and encourage switching (Smith and Bolton, 1998; Slater, 2008). For instance, good response tones positively impacts on satisfaction, repurchase intentions, and attitude toward the providers (Davidow, 2003; TARP, 1981). Edmondson (2011) found that the behaviour of middle managers in hospitals in terms of responding to failures, encouraging open discussion, welcoming questions, and displaying humility and curiosity significantly affects satisfaction, referrals, and profitability. Bitner *et al.* (1990) theorized the double deviations principles and with the support of other scholars (e.g., Smith and Bolton, 1998; Davidow, 2003) concluded that it is often the provider's response rather than the failure itself that causes disgust. This principle draws from 'service recovery paradox,' which posits that graciously recovered customers were much more satisfied than those who had not encountered any problems with the initial experiences (Etzel and Silverman, 1981; East *et al.*, 2009; Zeithaml and Bitner, 2000). Further, research (del Rio-Lanza *et al.*, 2009; Michel *et al.*, 2009) suggests that a good recovery can turn angry, frustrated customers into loyalists; in other words, it creates more goodwill than if things had gone right abinitio.

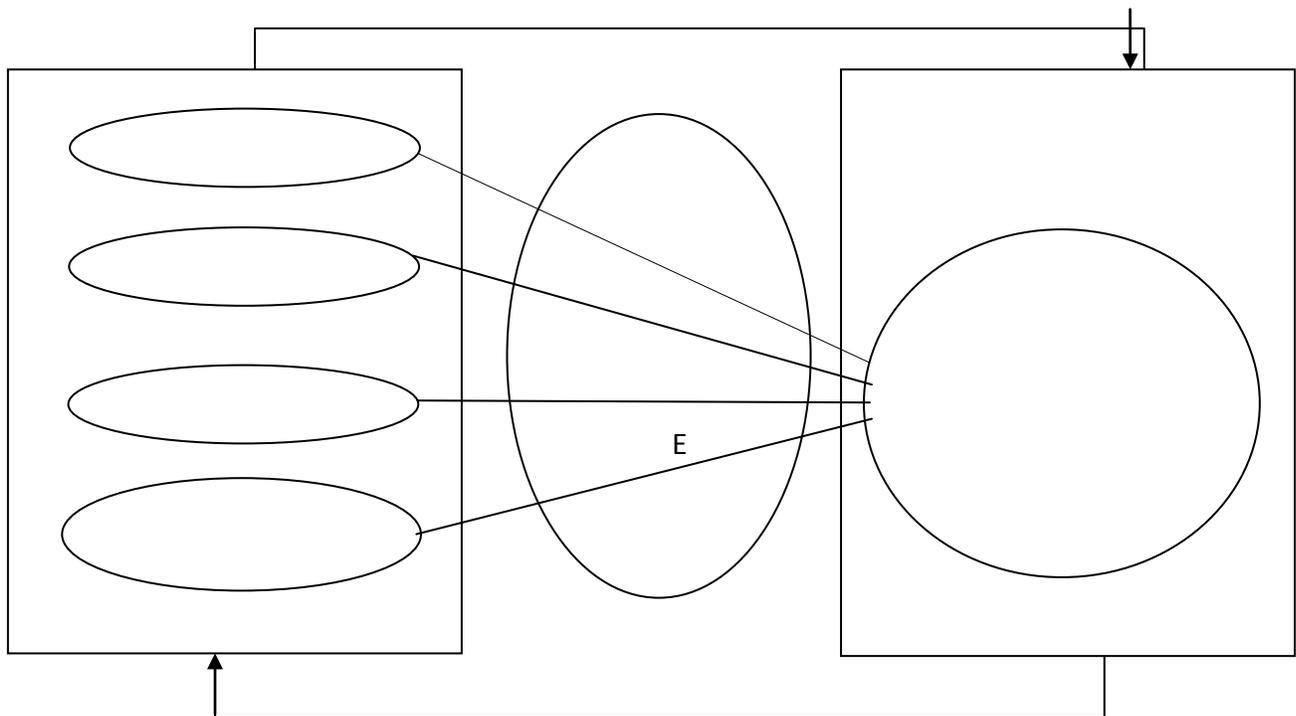
a. Competitive Positioning

Almost every market seems competitive; therefore service recovery borne out of using assets and competencies to build/hold customer-endorsed values (carving out a distinctive niche in the customers' mind) and difficult-to-copy uniqueness (capability gaps) is an enviable competitive edge in most markets. Perceiving people as a key factor to sustain competitive advantage amidst environmental change and globalization, Macmillan (1982) suggests that strategists seek opportunities to upset industry equilibrium, to pursue strategies that disrupt normal course of industry events and to forge new industry conditions to the disadvantage of competitors. Firms position themselves ahead of rivals by offering reliable, timely, and hassle-free recovery to injured customers (Porter, 1980; Aaker, 1998; Drucker, 1993; Teece, 2000). For instance, promulgating unambiguous policies, rules, structures, and procedures that encourage customers to register service failures; simplifying contacts to get such issues resolved; and encouraging customer-friendliness, flexibility, and tactical decisions are ingredients of competitive positioning. Whichever positioning strategy pursued in recovery, the essential thing is that reasonable number of actual and potential consumers must endorse and perceive it as possessing superior perceived values. In other words, a positioning strategy may be ideal in terms of conformance value (value from firm's point of view) but

lacks superior perceived value (value from customer's point of view), which ultimately makes it difficult, if not impossible, to drag in the desired market behaviour.

b. Service Recovery and Competitive Positioning

The golden rule (J. C. Penney); the equity and social justice theories (Aristotle); the justice dimensional theory (S. Tax and S. Brown); utilitarian theory; social exchange theory; the law of distributive justice, amongst others, provide baselines for justice and fair-play, and offer explanatory lenses to people's reactions to situations. These theories assume consumption expectations as defined probabilities of the occurrence of a negative or positive event (Oliver, 1981). Aside these baseline theories, specific studies (e.g., Bitner *et al.*, 1990; Johnston and Fern, 1999; Davidow, 2003) underpin this work. For instance, Bitner *et al.* (1990) correlated the influence of redress, credibility and attentiveness on customer satisfaction; Johnston and Fern (1999) conceptualized speed, redress, apology, and credibility without empirically testing actual recovery; and Davidow (2003) correlated the influence of timeliness, facilitation, redress, apology, credibility, and attentiveness on satisfaction and post-complaint behaviour. The strength of this study as espoused in the framework below lies more on the study's knowledge contribution along extension of theory, which recognizes the constructs of user collaboration and competitive positioning and the moderating effect of firm's size.



H1: Facilitating customer service recovery significantly influences firm's competitive positioning.

H2: Appropriate redress in the event of service failure significantly influences firm's competitive positioning.

H3: Timeliness of recovery has significant influences on firm's competitive positioning.

H4: Collaborating the affected users in service recovery has significant influence on

firm's competitive positioning.

H5: The relationship between service failure recovery and competitive positioning is moderated by firm's size.

Facilitation

The complaint management theorists often talk of the ease with which an injured consumer receives hassle-free and timely resolutions. Scholars (Kim *et al.*, 2009; Bolting, 1989; Nyer, 2000) reported that encouraging complaints and making resolution-mechanism (facilitation) easily available impacts positively on complaints likelihood and negatively on negative customer values. The probability of the complaint being resolved and the number of contacts expended by a consumer to get a complaint resolved have negative effects on measures of competitive positioning (Davidow and Leigh, 1998; Kolodinsky, 1992). Further, immediate resolution (Sajtos *et al.*, 2010) and claims handling, including simple and convenient claims procedures (Durvasula *et al.*, 2000; Slater, 2008) significantly impact on competitive positioning.

Other studies (e.g., Blodgett *et al.*, 1997; Davidow, 2003) reported that facilitation show no effect or negative effect on customer values and market share growth showed, yet some others (Fornell and Wernerfelt, 1988; Kolodinsky, 1992) reported otherwise. An increase in facilitation has no effect on sales growth and distinctiveness; only that it lowers negative customer values (Davidow, 2000). Other studies (Blodgett *et al.*, 1997; Bolting, 1989) supported the findings from the perspective of customer values but disagreed on sales growth and distinctiveness. The opportunity to present complaints to a patient listener (facilitation) (Goodwin and Ross, 1992), procedural fairness as manipulated by expression of feelings (Ruyter and Wetzels, 2000) as well as warranty expectations and disconfirmation (Halstead *et al.*, 1993) significantly predict competitive positioning after complaint handling. McColl-Kennedy and Sparks (2003) found that equal treatment to customers (neutrality) impacts negatively on satisfaction, therefore flexibility is a distinctive feature of facilitation.

Redress

Studies (see Ruyter and Wetzels, 2000; Sparks and McColl-Kennedy, 2001) somewhat imply mixed relationship between redress and competitive positioning. Actual redress has a significant effect on perceived complaint response, which ultimately impacts positively on customer satisfaction and distinctiveness (Ruyter and Wetzels, 2000), repurchase intentions and sales growth (Sparks and McColl-Kennedy, 2001; Mack *et al.*, 2000), customer value and word-of-mouth (Blodgett *et al.*, 1997). Though, satisfaction with personnel claims (redress) primarily drives overall satisfaction, negative relationship exists between redress and word-of-mouth activity (Davidow and Leigh, 1998; Hoffman *et al.*, 1995). Other studies (e.g., Hoffman *et al.*, 1995; Sparks and McColl-Kennedy, 2001) found positive relationship between redress and sales growth but a negative relationship between redress and customer values.

Kelly (1979) found that dissatisfied consumers want replacement whereas Mount and Mattila (2000) extended the studies to full or partial compensation as opposed to absence of redress and found a significant impact on competitive positioning. There is a positive relationship between the percentage of financial loss reimbursed and satisfaction with complaint response; in other words, partial compensation rarely creates sales growth and distinctiveness (Davidow, 2003; McCollough *et al.*, 2000). Blodgett *et al.* (1997) tested three levels of redress- full exchange, 50 percent discount, or a 15 percent discount (distributive justice) for tennis shoes that wore out quickly and found that total satisfaction creates corporate distinctiveness amongst complainants. Further, they found that the main effect of redress was significant only when paired with high attentiveness (interactional justice).

Goodman and Ross (1992) paired redress, facilitation and apology; and found that little redress increases the strengths of both facilitation and apology beyond just the main effects. Fornell and Wernerfelt's (1988) mathematical model shows that generous compensation impacts positively on repurchase and sales growth. Boshoff (1997) found that the higher the compensation, the more satisfaction and consumer values enjoyed. Supporting this finding, scholars (Megehee, 1994) found that over-benefits impact positively on satisfaction, repurchase, sales growth, customer value, and favourable word-of-mouth. Other studies (e.g.; Estelami and De Maeyer, 2002; Mack *et al.*, 2000) contrasted the finding (above-normal compensations do not increase competitive

positioning); an indication that caution need be exercised in service providers' over-generosity to avoid impairing customer value. Goodwin and Ross (1992) investigated the difference in redress requirements between pecuniary and non-pecuniary complaints and found that in service delays (no direct financial loss), 10 percent discount (redress) impacted positively on satisfaction. Similarly, Brown *et al.* (1996) showed that offering free-gift wrap (redress) after a situation of lack of attention and slow service (no explicit loss) has a significant impact on satisfaction.

Timeliness

Response speed is of essence in some recovery exercises, though scholarly evidence seems somewhat mixed. Studies (Blodgett *et al.*, 1997; Boshoff, 1997; Sajtos *et al.*, 2010) reported that actual response time is not a significant determinant of competitive positioning rather perceived response time. Response speed does not impact significantly on repurchase intentions, sales growth, customer values, distinctiveness or word-of-mouth likelihood (Davidow, 2003). Further, timeliness does not impact on satisfaction or appropriateness of the failure recovery rather what counts most is what management responds with and how it is expressed (Estelami, 2000; Megehee, 1994; Slater *et al.*, 2008). Other studies found that timeliness impacts positively on corporate image (Clark *et al.*, 1992), attitude, satisfaction, re-patronage, and word-of-mouth (Durvasula *et al.*, 2000; Conlon and Murray, 1996) since it is far more superior to delayed response (Hoffman *et al.*, 1995). Timeliness impacts positively on procedural justice, which in turn has positive effects on recovery satisfaction, re-patronage, and word-of-mouth (TARP, 1981; Smith *et al.*, 1999). Speedy action positively impacts on satisfaction with delight to organizational response (Estelami, 2000) and claims handling (Durvasula *et al.*, 2000).

Conlon and Murray (1996) reported that response speed impacts positively on satisfaction and repurchase intentions whereas Davidow (2000) found it to positively impacts on satisfaction and word-of-mouth but no effects on repurchase intentions or word-of-mouth likelihoods. We can then conclude that the strength of response speed in determining competitive positioning is subject to the industry, customer perception, and product category. Response speed is only critical in non-pecuniary complaints (Gilly and Gelb, 1982) and when severely delayed by service representatives (Boshoff, 1997). Though a late response is significantly inferior to a slightly delayed response, an immediate response is less effective than a slightly delayed response; thereby raising question on appropriate timing of a recovery. Given that customers' perception differs; response speed is a critical factor when delayed beyond expectations. Gurney (1990) opines that a customer of fast-food restaurant appreciates response speed whereas little less speed and little more care are expected in complex loans. Firm's speed of response has no effects if not paired with redress (Clark *et al.*, 1992; Davidow, 2003) because without at least minimal level of redress, the consumer will be so dissatisfied that timeliness will cease to be critical.

User Collaboration

Some 18th century political philosophers and majority of 21st century business scholars and practitioners espoused value co-creation (Prahalad and Ramaswamy, 2004), service-dominant (S-D) logic of marketing (Lusch and Vargo, 2004), putting customers to work (Zwick *et al.*, 2008), customer-centric marketing (Bonsu and Darmody, 2008), or other terms that emphasize users as a source of competence building (Prahalad and Ramaswamy, 2004) and wealth creation (Bornu and Darmody, 2008). Handling complaints is a test of customer orientation; therefore, scholars (e.g., Zeithaml and Bitner, 2000; McCollough *et al.*, 2000) posit that involving users in resolving their issues affects customer value, difficult-to-copy distinctiveness, and market share. Interface with active and competent customers in resolving service failures has the characteristic of making all managerial decisions responsive to customer creativity and enhanced socio-economic and socio-cultural benefits (Arvidsson, 2004).

User interface in a mutually beneficial innovation re-defines and re-engineers competitive weapons (Ogawa and Pillar, 2006) in terms of minimized risks of product failures and loyalty defection, stronger relational bond and word-of-mouth publicity, reduced cycle time and user education, and maximized profits through reduction of large inventory, product returns and distribution costs (Bae, 2005) and willingness to pay premium price. Boellstorff (2008) suggests that developers' ability to innovate and to build competitive advantage amidst product varieties is subject to interface with customers in a mutually beneficial manner that conforms to the principles of value creation. Drawing from management theories, Awa *et al.* (2011) suggest that firms build competitive advantage when they handle customers' disgusts in a manner that the customers feel recognized in the survival and growth of the organization.

The Moderator

Studies found that the technical efficiency increases with firm size's of the firm (e.g. Alvarez and Crespi, 2003; Gumbau-Albert and Joaquín, 2002). Studies (e.g., Kwon and Zmud, 1987; Zhu *et al.*, 2003) suggest that large firms exhibit higher technical competence and show more likelihood to attract customer satisfaction with recovery and ultimately competitive advantage. Conversely, large firms find it more difficult to keep all departments efficiently coordinated; thus the need for Maksimovic and Gordon's (2002) optimal firm size and non-linear relationship between size and firm performance. Optimal firm size explains firm's most competitive size expressed in per- unit profit given the industry and time. Densmore (1998) surveyed online service recovery and found about 95 percent of large firms to be deeply involved against 2 percent of small firms. Similarly, National Statistical Resources of 1999 from Australia, Denmark, Finland, Japan, and Netherland reported that diffusion of online service recovery amongst large firms was between 80 and 86 percent; for firms with 20 employees or more, 61-95 percent; and for very small firms, between 19 and 57 percent (OECD, 2003). Service representative's credibility as a function of firm size impacts significantly on repurchase intentions, post-complaint satisfaction, competitive positioning, and word-of-mouth (Maxham and Netemeyer, 2002; Alvarez and Crespi, 2003).

Methods

Data were drawn from the opinions of 140 service executives of the six existing GSM and CDMA firms, and 741 federal government-employed teachers (excluding part-time teachers, PTA teachers, and NYSC teachers) of the seven FGCs/FGGCs in the South-Eastern Nigeria. Questionnaire made up of structured disguised, structured-undisguised, and unstructured questions was designed for the exercise and the FGCs and FGGCs chosen were those in locations where GSM and at least one CDMA firms have network coverage. On accounts that Visafone, the only CDMA firm operating effectively in the South-eastern Nigeria at least for now (see table 1), is yet to extend its network to Ezemgbo, Leija and Okposi, the FGCs or FGGCs therein were excluded. However, our analysis was based on 429 valid returned copies of the questionnaire.

Table1: Government pay-rolled Teachers in FGGCs and FGCs, and respondents from service providers

	Fed. Govt. Colleges	No of Academic Staff	Sample Size	Service Provider	Customer care executive	Customer care Manager	Sample Size
1.	FGGC, Onitsha	145	145	MTN	34	10	44
2.	FGC, Nise	77	77	GLO	25	8	33
3.	FGC, Enugu	158	158	Etisalat	18	6	24
4.	FGGC, Leija	68	XXXX	M-tel	6	2	8
5.	FGGC, Owerri	134	134	Air-tel	8	3	11
6.	FGC, Okigwe	87	87	Visafone	16	4	20
7.	FGGC, Umuahia	115	115				
8.	FGC, Ohafia	35	35				
9.	FGC, Okposi,	48	XXXX				
10.	FGGC, Ezemgbo	41	XXXX				
	Total	908	741		107	33	140

Operational Measures

Boshoff's (2005) RECOVSAT scale was principally adopted to measure the independent variables. The scale is based on disconfirmation paradigm and measures customer expectations from a recovery. Having measured satisfaction with six dimensions of service recovery (communication, empowerment, feedback, atonement, explanation, and tangibles); all the four dimensions of service recovery of this study seem to be captured by the RECOVSAT scale. Specifically, user collaboration was captured by communication, explanations, and empowerment. The RECOVSAT scale as it relates to redress specifies full and tangible compensation; timeliness-promptness of tangible recovery; and facilitation- empowerment and simple resolution of complaints. Competitive positioning was operationally measured by difficult-to-copy distinctiveness, market share growth, and customer values. Responses to batteries of statements were linked to a 7-point scale (viz., from very favourable via unfavourable) of semantic differential test of Osgood and Tanenbaum since we used bipolar adjectives/phrases to provide respondents with an opportunity to evaluate the constructs.

Validity and Reliability

Previous studies (see McColl-Kennedy and Sparks, 2003; Davidow, 2003) had already been confirmed the validity of our measurement scales but due the fact two situations are rarely the same, we reconfirmed by pre-testing the scales on selected sampling units to permit correction of inconsistencies and/or ambiguities before the actual study. On the other hand, Cronbach test measured the reliability of instruments that describe the dimensions. The instruments were internally related to the factors at levels more than 0.7 (see table 2).

Table 2: Reliability test

S/N	Construct	Number of cases	Number of items	Cronbach's Alpha
1.	Facilitation	429	5	0.860
2.	Redress	429	6	0.919
3.	Timeliness	429	5	0.867
4.	User collaboration	429	4	0.899
5.	Competitive positioning	429	3	0.861

Test Statistic

The analysis of this study involved descriptive and inferential statistics with SPSS (version 17) providing aids. The descriptive statistics involved measures of central tendencies; whereas the inferential statistics involved three parametric inferential tests- one way ANOVA, Pearson's product moment correlation, and multiple regressions analysis. While the three tests measured statistical significance; the second added strength of associations. The one-way ANOVA measured unequal bivariate relationships and compared mean difference(s) between groups to the variation within each group. Multiple regressions measured the overall correlation between each set of independent variables and dependent variable(s) while controlling the effects of other variables, including the contextual variable. Further, multi-collinearity, test of model utility, and coefficient of determination were performed to lend support to variables in the regression equation. When moderating factor was factored in, partial correlations analysis was used. However, because the data collected were mainly ordinal, SPSS procedure converted them to interval to permit the use of these inferential statistics.

Data Analysis and Discussion

Given that many service recovery alternatives exist in literature (e.g., Smith *et al.* 1999; Boshoff, 1999; Davidow, 2003), this paper analyzed facilitation (X1), redress (X2), timeliness (X3), and user collaboration (X4) using multiple regressions. Table 3 below provides that the mean scores for the variables range from 4.74 (weakest) to 5.42 (strongest), indicating that the respondents believed that all the independent variables have relatively high scores in determining the behaviour of the dependent variable.

Table 3: Descriptive Statistics of Variables

Variable	Mean	N	SD
Facilitation	5.16	429	1.30
Redress	4.97	429	1.56
Timeliness	5.13	429	1.36
User collaboration	4.74	429	1.78
Competitive positioning	5.42	429	1.09

Since we need to compare opinions, we performed ANOVA before other tests. From table 4 below, F_{Cal} equals 141.232, $F_{tab}(0.05,1,427)$ equals 3.84, and $0.00 < 0.01$, we conclude significant difference between the opinions of customers and staff about the assessment of service recovery. Also, $F_{38.525} > F_{3.84}$ and $0.00 < 0.01$, therefore, there is significant difference between the opinions of customers and staff in the assessment of competitive positioning.

Table 4: ANOVA on service recovery and competitive positioning
ANOVA

	Sum of squares	df	Mean Square	F	Sig.
Service Recovery					
Between Groups	159.891	1	159.891	141.232	0.000
Within Groups	483.414	427	1.132		
Total	643.305	428			
Competitive positioning					
Between Groups	46.598	1	46.598	38.525	0.000
Within Groups	516.483	427	1.210		
Total	563.082	428			

Source: SPSS Output (based on 2012 field survey data)

Multi-collinearity

The independent variables may have linear relationships with one another in the regression equation in an attempt to explain and/or predict the dependent variables. The complex correlation of the data precipitated stepping beyond mere pairwise correlations to permit the use of tolerance and variance inflation factors (VIFs) associated with X_i . The tolerance explains the proportion of an independent variable’s variance that is not accounted for by other independent variable(s) found in the model equation. Tolerance values heading towards zero and values of VIF exceeding 10 are principal signs of multi-collinearity. Going by these rules, we conclude that there is no threat of multi-collinearity amongst the dimensions of service recovery.

Table 5: Multi-collinearity test

Model	Eigenvalue	Condition index	Unstandardized Coefficient		Standardized Coefficient	T	Sig	Collinearity statistics	
			B	Std.	Beta			Toler	VIF

Dimension				Error				ance	
(constant)	8.7772	1.000	2.631	0.233	-	11.285	0.000	-	-
Facilitation	0.021	20.450	0.014	0.070	0.018	0.201	0.819	0.243	4.119
Redress	0.013	26.430	0.087	0.067	0.082	1.303	0.363	0.187	5.348
Timeliness	0.035	15.806	0.137	0.058	0.030	1.392	0.654	0.329	3.040
Demonstrations	0.009	31.865	0.021	0.052	0.189	0.032	0.019	0.243	4.274

Test of Model Utility

To assure the usefulness of the overall regression statistics, F_{Cal} equals 20.889, $F_{tab}(0.01,1,428)$ equals 3.84, and $0.00 < 0.01$; therefore, we conclude that the regression model is useful to the extent that the predictor variables significantly predict competitive positioning. The implication is that at least one of the independent variables has none zero coefficient.

Table 6: F-ratio

ANOVA^b

Model	Sum of Squares	df	Mean Square	F	Sig
1. Regression	191.579	8	23.947	20.889	0.00 ^a
Residual	481.497	420	1.146		
Total	673.077	428			

- a. Predictors: (constant) Service Recovery
- b. Dependent Variable: Competitive positioning

Coefficient of Determination

The model summary shows the coefficient of determination ($R^2=0.285$, $p<0.01$) indicating that the predictor variables explained about 29 percent variations of competitive positioning; thus other factors explain the rest. The implication is that successful recovery impacts on firm’s competitive positioning.

Table 7: Model Summary

Model	Variables Entered	R	R ²	Adjusted R ²	Std Error of the Estimate
1.	a) all the predictor variables b) competitive positioning	0.534 ^a	0.285	0.271	1.07071

Source: SPSS Output (based on 2012 field survey data)

Table 8 indicated that all the recovery alternatives have varying significant degrees of relations with competitive positioning at $p<0.01$ (see facilitation, 0.45, $p<0.01$; redress, 0.42, $p<0.01$; timeliness, 0.46, $p<0.01$; and user collaboration, 0.33, $p<0.01$). Table 10 confirmed this when it reported a significant relationship between service recovery and competitive positioning ($R = 0.486$; $p < 0.01$). Table 9 shows that the average weighted impact of

facilitation on competitive positioning appears direct (positive) and strongest ($\beta= 0.220$), thereby lending support to H1. While this finding contrasts those of previous studies (e.g., Blodgett *et al.*, 1997; Davidow, 2003), which reported that facilitation has no effect or negative effect on customer values and market share growth; others (Nyer 2000; Kolodinsky, 1992; Durvasula *et al.*, 2000) lent support to the finding. When redress was factored into the equation, H2 was supported based on significant positive correlations ($\pi= 0.42$, $p<0.01$) with an average weighted impact ($\beta= 0.080$) on competitive positioning. While studies (see Ruyter and Wetzels, 2000; Sparks and McColl-Kennedy, 2001) support this finding; others (Davidow and Leigh, 1998) somewhat contradicted when they reported that redress negatively impacts on customer value and sales volume.

Table 8: Pearson Correlation Coefficients of the Control Variables

	Correlation Coefficients				
	CP	Fac	Red.	Tim.	UC
CP	1				
Fac.	0.45**	1			
Red.	0.42**	0.72**	1		
Tim.	0.46**	0.74**	0.65**	1	
UC.	0.33**	0.65**	0.82**	0.60**	1

Note: Correlation is significant at *0.05 and **0.01 levels (two-tailed test)

CP = competitive positioning; Fac = facilitation; Red = redress; Tim = timeliness; UC = user collaboration

For timeliness, the correlation coefficient was significant ($\pi= 0.46$, $p<0.01$), thereby providing support to H3. However, the strength of this relationship ($\beta= 0.178$) is stronger than that of redress ($\beta= 0.080$) and weaker than that of facilitation ($\beta= 0.220$). Previous studies supported this finding when they found that timeliness is far more superior to delayed response (Hoffman *et al.*, 1995) and that it impacts positively on corporate image (Clark *et al.*, 1992) and post-complaint attitudes (Durvasula *et al.*, 2000; Conlon and Murray, 1996). On the contrary, other scholars (Davidow, 2003; Estelami, 2000) found that timeliness does not impact significantly on sales growth, customer values, distinctiveness or word-of mouth likelihood; rather what counts most is what management responds with and how it is expressed.

Table 9: Regression Analysis

Model Variable	β	Correlation Coefficient	t-test
Constant	2.631	-	10.017
Fac.	0.220	0.023	0.278
Red.	0.080	0.100	1.049
Tim	0.187	0.203	2.823

The four dimensions of independent variables studied explained varying variations of competitive positioning and led to specific conclusions. Each dimension differs in terms of its level of statistical interaction and direction of relationship though all were found critical in determining competitive positioning at $p < 0.01$. Facilitation and timeliness were the most critical factors, followed by redress, and user collaboration. Therefore, the ease with which a disgusted consumer accesses service providers, registers his complaints, and perhaps receives hassle-free and timely resolutions impact on measures of competitive positioning. The statistical interaction between recovery alternatives and measures of competitive positioning were significantly moderated by firm's size; larger firms are more inclined to improving the dimensions of service recovery, and ultimately provide an improved competitive positioning. The implications of these conclusions are theoretical and practical.

▪ **Theoretical**

Theoretically, this paper expands the frontier of knowledge on B₂C services and, specifically, contributes to the growing literature pertaining to telecommunications industry. The academia is provided with another stream of validated research evidences as well as extended theory that may stimulate further inquiries and cross-validating. The strength of the proposed model was the addition of user collaboration and competitive positioning, which seem neglected by previous scholars (see Davidow, 2003; Bitner *et al.*, 1990; Smith *et al.*, 2009; Boshoff, 1999; Johnston and Fern, 1999), as well as correlating the four recovery alternatives with competitive positioning. Drawing the significance of competitive positioning from previous scholars (Porter, 1980; Aaker, 1998; Teece, 2000; Thompson *et al.*, 2004) and that of user collaboration from a few 18th century political philosophers (e.g., Jean Jacques Rousseau and John Locke) and 21st century scholars (Pralhalad and Ramaswamy, 2004; Lusch and Vargo, 2004; Ogawa and Pillar, 2006) that championed the mobilization of communitarian platform to ensure mutual sharing of social knowledge; the paper validated the correlation between recovery alternatives and competitive positioning. Aside this being worthwhile for acute dearth of scholarly inquiries that validates the two extremes, authorities (Newby *et al.*, 1996; Chernoff, 1994; Kozma *et al.*, 1978) suggest that greater degree of social knowledge sharing stimulates interests, and reinforces learning, attentiveness, and recalls.

▪ **Practical**

Since all the dimensions of recovery surveyed are critical in determining the behaviour of competitive positioning, players are encouraged to create competitive advantage via dissuading post consumption detrimental actions as well as encouraging customers to progress upward in the loyalty ladder by having their ordeals addressed. On accounts that consumers who suffer service failures show willingness to retain their patronage if their issues are adequately addressed, the study implies service providers simplifying recovery procedures and emphasizing ease of access to resolution(s); training and retraining service officers to be proactive and relational in detecting and explaining company's policies, procedures, and rules as they relate to customer issues; timely responses; and seeking interface in addressing customer ordeals. Finally, this study points to value creation and value delivery in the manipulating and regulating recovery instruments since the study shows that user collaboration without actually improving upon the services inversely correlate with competitive positioning.

Limitations and Suggestions for Further Studies

The application of the study's findings is limited by its domain and other factors. First, its cross-sectional nature means that the causal relationships identified may vary across sectors and regions or may even lose meaning overtime. Therefore, extended measures by cross-validating our scales and/or by engaging in longitudinal study are required. Second, some errors seemed unavoidable in the SPSS conversion from ordinal to interval scales just as all the measures of constructs represented subjective perceptions and prone to biases. Finally, this paper did not study the strength of factors that cause service failure and user collaboration is relatively under-investigated in service recovery; therefore, further scholarships are encouraged.

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CAN ACTIVE INSTRUCTIONAL STRATEGIES HELP COLLEGE-AGE MINORITY STUDENTS SUCCEED IN MATH?

Dr. Candice L. Ridlon
University of Maryland Eastern Shore
Princess Anne, Maryland, USA
cridlon@umes.edu

ABSTRACT

Research and standardized test scores in the U.S. for the past three decades have shown a significant achievement gap in mathematics between minority students and their non-minority peers in grades K-12. Students at historically black colleges and universities (HBCUs) exhibit these selfsame skill deficits, yet they are expected as adults to close any pre-existing skill gaps on their own. Even for those with high self-efficacy, factors such as depressed expectations from their instructors, low math self-confidence due to past failures in high school and/or college and the cultural pressure to appear self-sufficient (for males) often inhibit achievement and instead cause students to sabotage their own success by indulging a self-fulfilling prophecy of failure. In this experiment, two groups of low-achieving college-age minority students were taught using different instructional strategies. One group attended a typical 3-day a week university lecture course (Control, or C), supported by online tutorial services. The second group attended a 5-day a week course (Experimental, or E) with the same 3 lecture days and online support, but supplemented with two active learning days. Data was collected on both groups: grades, pretest scores, and a 5-point Likert scale attitude survey. For students that received passing grades (“C” or better), both groups were able to adequately identify the positive correlation between achieving a higher grade in the course and three behaviors: the number of hours they spent studying, the value of discussing and solving problems with peers, and the importance of regular attendance. However, there was a significant difference between the failing students in the E and C groups. The failing E group correctly recognized the same three relationships, whereas the C group was unable to reach the conclusion that their own behavior in any of these three areas had any effect on their grade. Apparently two additional days using alternative active instructional strategies empowered students to understand the importance of assuming responsibility for their own performance.

BACKGROUND

The achievement gap between minority and non-minority students with respect to mathematics has been an issue for the past three decades. Many factors contribute to the low-achievement of minority students, but low expectations from teachers are often cited as a major concern. According to Steele (1997), “minorities tend to develop a perception of their ability, intellectual performance, and identity of self based on stereotypes that pertain to their group.” He contends that social identity becomes significant whenever a person is treated according to that stereotyping, thus affecting not only their opportunities for success but also the perceived self-identity of each individual group member. Typical stereotypes begin as early as kindergarten, when teachers form generalizations about the characteristics of minority students, and then subsequently use these beliefs to determine what they expect of children. Complicating the issue is the fact that most minority students have their own understanding of their cultural group. They tend to perceive that groups of people with similar cultural identities have their place within the ordered workings of the larger society (Ogbu, 1991; Martin, 2000). African American males, in particular, present well documented self-defeating behaviors such as “showing off what they were expected to learn and be like – i.e. talking and ‘holding the floor’- rather than trying to develop the quality, deeper conceptualized understandings of mathematics” that their teachers were trying to foster (Murrell, 1995).

The result, according to Johnson (2000), is that throughout their education, minorities are expected to perform lower than their non-minority peers. These expectations ultimately lead to a difference in instruction between the two student populations. Minority students tend to receive instruction that emphasizes the steps needed to solve a

problem rather than the application of the skill to real life situations (Hankes, 1996). In comparison, the instruction seen in a classroom of high-achieving non-minority students stresses interpretation of complex problems (Clark, 1999). This difference is problematic since basic skill proficiency is not enough for “true knowledge and mastery of mathematics” (Secada, 1992,). An inability to transfer between different type of similar math problems eventually leads to inefficiency and shallow understanding of concepts, so when low-achieving students take assessment test, they are unable to successfully work problems that are not exactly like the ones worked in class (Pesek & Kirshner, 2000). Because their teachers have focused on solving problems as a watered-down series of irrelevant “steps”, these students are incapable of using mathematics in any type of authentic situation (Ridlon, 2009). The low expectations of teachers become a self-sustaining prophesy: students *do* achieve less.

Lowered expectations lead to low-achievement as well as other negative outcomes that may last a lifetime. “Low-achievement substantially reduces the chances of school completion and university entrance.” (Marks 2006) Labeling a child as a low achiever can severely influence the child’s self perception, which can have consequences throughout their lifetime (Dickens, 1996). According to Marks (2006), about 48 percent of students that drop out of school during high school are low achievers. According to the Bureau of Labor and Statistics (2011) the median weekly earnings of a person with less than a high school diploma is \$444, therefore reducing the quality of life for these students in the long run.

However, research has shown that instructional strategies can greatly influence the mathematical success of low-achieving college-age students. Working with minorities, Mulat and Arcavi (2009) report that success in mathematics learning can shift from high school to college by exposure to new ways of thinking about math. Classroom activities that foster learning with understanding can change attitudes and interest in mathematics. In spite of past setbacks, low-achieving minorities can see their success and failure as attributable to self-controllable (e.g. fostered self-regulation) rather than uncontrollable external factors (e.g. their particular instructor) (Mulat and Arcavi , 2009). They found that this realization helped students take responsibility for their own learning and invest in their studies to regain success.

The implications for classroom practice at the university level are significant. In their research, Swigart and Murrell (2001) found that minority students in community college were encouraged to exert greater quality of effort when instructors built active learning assignments into their courses and used computer technology to establish communication and interaction between faculty members and students as well as among students. Active learning assignments are not just the latest academic fad – on the contrary, active learning is a well-tested approach that teachers committed to student learning at any level should consider (Mills, 2012). Active learning tasks focus on the four key components related to “doing” and “reflecting”: (1) critical thinking, (2) individual responsibility for learning; (3) involvement in open-ended activities; and (4) organization of learning activities by the professor (Berry, 2008). In math, some examples of active learning are peer group problem solving, students providing verbal explanations of solutions at the chalkboard, or written extensions of lecture examples. Swigart and Murrell found such instructional strategies resulted in greater gains in learning. They point out that these strategies are especially important for first-generation college students in the absence of role models who can help these students understand their own responsibility for learning and development – a situation typical for the minority student body at an HBCU.

THE EXPERIMENT

This study involved minority students at a historically black college (HBCU) who were enrolled in a three credit hour mathematics course (College Algebra) over the period of one year. Students self-enrolled in two different kinds of sections of the course offered over in a variety of times of day, for a total of twelve sections participating in the experiment ($n = 338$). In order to eliminate the variable of teacher effectiveness, each instructor participating in the study simultaneously taught two sections of the course - one Control (or C) and one experimental (or E). The C group had a total of 137 students, while the E group had 201 students. Both groups of students attended a typical 3-day a week university lecture (M-W-F), studied the same curriculum, and used the same textbook (*College Algebra* by Stewart, Redlin, Watson, 3rd Ed.) supported by online tutorial services via

Enhanced WebAssign®. All students were able to work with peers outside of class whenever they pleased and all had access to a Math Lab staffed with peer tutors.

Instructors and Math Lab staff were trained in techniques for bolstering students' self-confidence and maintained high expectations for student performance at all times, so students from both groups should have benefitted from going to the Lab. Regular staff mini-workshops on the pitfalls of stereotyping reinforced the more positive themes of teaching the kinds of study skills that lead to success and helping students to recognize their own accomplishments and potential for learning. The Math Lab staff also encouraged students to ask questions without hesitation. However, students were explicitly taught to be responsible for their own learning and were discouraged from relying on Lab staff for instant answers. They were required to consult three different sources (textbook, videos, group members) before they could ask for help. The variety of tasks and diversity of assessment tools allowed students, Math Lab staff, and instructors to quickly identify students who were falling behind and intervene in positive ways to avoid apathy and foster continued high expectations. Grandstanding for the sake of recognition was discouraged, but talking about mathematics with deeper, meaningful quality was encouraged.

The differences in the instructional approaches lay outside of the commonly shared curriculum, the online homework assignments, the quizzes, the tests, and students' experience when attending the Math Lab. The six C groups did not use active instructional strategies during their three lectures, whereas during the E group's three lectures, professors included at least 5 minutes of active strategies during each lecture. Lecture activities might include students solving and explaining problems on the board, or working with peers next to them on a question rather than the teacher illustrating that example on the board.

In addition, the six E groups were required to meet two extra days per week in the Math Lab (Tuesday-Thursday), where they spent a minimum of 40 hours a semester doing active learning tasks that were related to "doing" and "reflecting." For instance, on Tuesdays, students worked in peer groups on authentic "word" problems that emphasized using mathematics in relevant scenarios. In one example, they created algebraic formulas and graphs to compare the actual cost of purchasing, insuring, fueling, and maintaining two different vehicles over the period of four years. A second problem required them to model the cost of saving for and eventually leasing their own off-campus apartment, both as a solo adventure and then with one or two roommates. Active learning strategies were also used in assessments. Although the E groups took two traditional chapter exams, two other exams were replaced with group projects that involved collecting real-life data and modeling that data with mathematical functions similar to those studied in the curriculum. Students wrote an extensive paper on their model, applying and explaining formulas learned in the course and making a PowerPoint presentation of their findings. Another active learning strategy was the format of their weekly quizzes. On Thursdays, E group students were required to work in groups to complete a "pre-quiz" worksheet which they knew would somewhat align with the quiz they would take at the end of class. Having the opportunity to specifically focus on the kinds of problems that would eventually make up the test greatly increased engagement. They worked seriously to understand, seeking in-time support from both their group members and the Math Lab staff.

Another innovation based on active learning strategies was the introduction of a Math Notebook in the E sections that taught and reinforced study skills. The Notebook was packaged for purchase at the bookstore, and encouraged active note taking during lectures because it had pages that were sectioned into areas for important formulas, graphs, new ideas, and recall of previous knowledge. Students were required to make written observations of 40 online videos of example problems, and "show your work" on all problems in daily assignments. As mentioned previously, all students used an instructional website (*WebAssign®*) to complete quizzes and homework, which provided interactive resources that assisted them in problem solving and gave immediate feedback. But, although both the C and E groups used the same sites, only the E group was continually prompted by the Math Lab staff to use all features of the site. The Lab staff also thoroughly checked each student's Notebook periodically and monitored group problem solving on the board to ensure that all students were actively participating.

Regardless of instructional model, both groups had common online homework, quizzes, and final exams. Data from all students in the C and E groups was collected from students' grade-point averages (GPAs), pretest score, pass rates, retention rates, time on task, active engagement with curriculum materials, and Student Surveys. This

data was analyzed using common statistical methods, including mean, correlation coefficients, hypothesis testing, etc.

RESULTS, ANALYSIS, AND DISCUSSION

Combining the results of all sections of College Algebra in the study (see Table 1) and using the null hypothesis that there is no difference in the two groups with an $\alpha = 0.05$, the GPAs and pretest scores of the C and E groups showed they were not composed of the same student population at the start of the experiment. The C group had significantly higher pretest scores and GPAs. There was not a normal distribution of ability levels between the two groups. For instance, the pretest average in the C group was 55.5%, and E group was 22.5%. There was also a significant difference in the GPAs of the two groups, and this relationship was not due to chance. The difference may have been due to the fact that the weaker mathematics students self-selected the 5-day a week E sections because they recognized their need for additional support. However, there was no significant difference in the number of C and E students who had previously attempted passing College Algebra, showing that failure in mathematics was commonplace at this HBCU.

By the end of the study, however, there was no significant difference in the pass rate between the two groups. Perhaps the reason that both groups had nearly the same level of success could be explained by the fact that the C group was initially ahead of the E group, so even without active instructional strategies, more of the students had the intrinsic ability to pass on their own. It should also be noted that the both groups had a comparable pass rate with the rest of the Math Department (33%). This result showed that the participating instructors did a normally acceptable job of instruction in the C sections and they were not inadvertently “punished.” So, as the lower achieving E group attained a similar pass rate to their more competent peers in the C group, these results imply that active learning strategies were able to bring the lowest achievers up to the success level of the overall student population in spite of their pronounced deficiencies at the start of the study. The ability to close the gap between C and E students’ initial skill levels appeared to be due to students’ increased engagement, which in turn increased student learning. All measures reflected higher levels of student engagement with course materials, resources, and instructional personnel.

Surprisingly, STEM (Science-Technology-Engineering-Mathematics) majors exhibited comparable weakness to non-STEM majors (based on pretests, GPAs, and number of times attempted Math 109 previously). They enrolled in comparable percentages in both C and E sections, and had significantly higher pass rates compared to their non-STEM peers. However, as Table 1 illustrates, approximately 60% of STEM majors still failed the course. Considering the stereotyping typical in minority populations, this mismatch of skill level/achievement and choice of major illustrated students’ willingness to shift their thinking about mathematics learning and their interest in gaining success once they entered college and in spite of their past experiences.

Table 1: Summary of Results

Measure	C Sections	E Sections	Conclusion
Mean Pretest Score (Given start of Week 2; based on prerequisites)	55.5%	22.5%	Significant difference ($p < 0.01$): E students have fewer prerequisite skills than peers in C
Mean Student GPA on 4.0 scale (upon enrollment)	2.67	2.16	Significant difference ($p < 0.01$): E students have lower GPA than C
% of students who attempted same course before the current enrollment	58%	59%	No significant difference ($p > 0.64$): Students have same rate of previous failure
Mean # hours per week students spent studying	3.3 h	7.9 h	Significant difference ($p < 0.01$): E students study more hours than C
% STEM (Science-Technology-Engineering-Math) majors enrolled (remaining non-STEM)	53.1%	51.8%	No significant difference ($p > 0.05$): Both Sections have same proportion of enrolled STEM/non-STEM majors
Overall Pass Rate ($\frac{\# \text{ passed}}{\# \text{ retained}}$)	30.4%	34.3%	Minor difference ($p < 0.1$): Both Sections have close to same pass rate

STEM-major Pass rate ($\frac{\# \text{ passed}}{\# \text{ retained}}$)	39.8%	41%	1) No significant diff: STEM pass rate ($p > 0.05$); 2) Significant diff: STEM & Overall
Mean # hours per week students spent going to tutors for extra help	1.4 h	3.1 h	Significant difference ($p < 0.01$): E students motivated to get more help than C
Attendance Rate (mean # students present on daily basis, retained in class)	71.5%	89.8%	Significant difference ($p < 0.01$): E students persevere, attend more often than C
Level of Cognitive Challenge in coursework -Bloom's Taxonomy: scale is 1 = low (memory) to 5 = high (synthesis)	2.7	4.2	Significant difference ($p < 0.01$): E students complete tasks at higher levels of cognitive thinking than those in C
Mean % of questions attempted on Department-Wide Final Exam (problems not left blank)	62%	91%	Significant difference ($p < 0.01$): E students have confidence to attempt more questions than peers in C

Examining the data, active instructional strategies appeared to have significantly increased the number of hours students chose to spend studying for the course, whether that meant working alone or going to tutors in the Math Lab. Both sets of data (as self-reported on the Students Surveys) yielded a $p < 0.01$, showing that the difference in the number of hours students in the E and C groups studied was not due to random chance. This meant that the E group students chose to study more on purpose, and most likely saw some relationship between achieving higher grades and the number of hours they spent studying, as well as the value of discussing and solving problems with their peers. The extra Tuesday/Thursday sessions and the active learning activities during lectures probably helped them to make this connection. Segregating the C group into passing and failing students, only the passing C group showed no significant difference from the whole E group – they also recognized this same positive correlation between studying and grades and used this knowledge to succeed in passing the course ($p > 0.31$ when compared to E, not sufficient difference between groups to reject null). The failing C students yielded a stark contrast: they apparently saw little connection between their own behavior and their grade in College Algebra (correlation coefficient < 0.30), attributing their failure to external factors (couldn't understand their teacher, quiz/test questions “not like” those on homework, etc.)

Further analysis of the open-ended comments in the Student Surveys in the E sections described high satisfaction with the active learning instructional strategies, especially peer interaction and support provided by the Math Lab staff. They also stated that they had been given the tools they needed to achieve the goals expected of them, several specifically mentioning the Math Notebook or videos. In contrast, Student Surveys in the C sections revealed a general apathy and disengagement with course content, and students showed little understanding of their own responsibility for or attention to the learning process. Written comments were sparse and focused on external factors like their instructor's accent.

Attendance was another aspect which students could control and thus exhibit their awareness of taking responsibility for their own learning, thus it was of particular interest in this study. Students who miss class also miss the opportunity to hear the material presented in the lecture, which often leads to lower achievement. In this study, absenteeism was significantly higher in the C sections in spite of the fact that attendance was only taken three days a week. One would suspect that absenteeism would be higher in the 5-day per week classes because there were more days of class and therefore more opportunity to be absent, yet the converse was true. Perhaps working in peer groups contributed to the formation of a “community of learners” where there was a perception that others would miss them if they weren't present. Another possible explanation was that the learning strategies in the E group allowed students to become actively engaged in the course content, which in turn might have been deemed meaningful and/or sufficiently enjoyable to make attendance worth the effort.

To measure of the quality of activities in the E group and assure they met the criteria for active learning as described earlier by Berry (2008), a scale based on Bloom's Taxonomy was used. The results of that analysis showed that E students completed tasks at significantly higher levels of cognitive thinking than those in the C group. The effectiveness of these active learning strategies resulted in E students' having improved self-confidence, as illustrated by the fact that they attempted to solve more problems by the end of the course on their Final Exam than their peers in C sections, who left more problems blank.

CONCLUSION

We used a variety of active learning strategies in this study: students doing problems on the board during lectures, peer group work on authentic problems, a group-motivated weekly quiz format, explicit instruction on the full use of online resources, graded Math Notebooks that taught and reinforced study skills, videos of problem solving, and real-world application projects that allowed students to use the curriculum from lectures in meaningful ways. Based on the research results, it can be concluded that the use of active learning strategies benefited college-age minority students. Such strategies helped students realize that three behaviors would increase their success in math: the number of hours they spent studying, the value of discussing and solving problems with peers, and the importance of regular attendance. This realization allowed students to assume responsibility for their own learning and taught them how to take real advantage of resources available to them. Although the data showed only a small increase in the pass rate, considering the significantly lower skill levels of the E group at the start of the study it became apparent that the active learning strategies allowed them to catch up to their stronger peers in the C group.

Notably, in both sections the homework website gave immediate feedback and allowed students to self-monitor mastery of the content. However, online support alone was insufficient to help all students recognize any positive correlation between their own behavior and their success in the course, as illustrated by the fact that so many of the more competent C group students were unable to make this connection and failed the course. And, even though both groups used the Math Lab where instructors and staff consciously avoided stereotyping, maintained high expectations for all, and where they explicitly taught students to be responsible for their own learning, it took the innovations of the active learning strategies for students to become sufficiently engaged and feel accountable for their eventual grade in College Algebra.

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Revisiting the Factors Affecting Dividend Policy of Companies in India: A Regression Analysis

Dr. Dinesh Kr. Sharma and Ritu Wadhwa
Assistant Professor
Gautam Buddha University
Greater Noida – 201310
India
Dinesh@Gbu.Ac.In, ritugini@gmail.com

ABSTRACT

The most important function for the finance managers across the world is to distribute the dividends amongst its shareholders. This depends on the trend of the turnover and control of management for its expenditures. The availability of profits and trends of dividend payment have always been considered as the most important factors for determining the dividend policy of the companies. In this paper, an attempt has been made to ascertain influence of the factors i.e. retained earnings, price to book value ratio, price earnings ratio and current ratio on the dividend decision of Nifty-50 companies for a period of 2003 to 2012 based on the secondary data of 43 out of 50 listed companies in NSE (National Stock Exchange). The data has been sourced from Prowess database of the Centre for Monitoring Indian Economy (CMIE) and the technique of multiple regression analysis is used to analyze the data. The result shows that 17% of variation has been explained by the independent variables and result is statically significant. Current ratio and Retained Earning ratio are negatively associated with the dividend payment whereas price to book value ratio is positively related with equity dividend payment of the firms

Keywords: *Dividend Payout Policy, Price to Book Value, Price Earning Ratio, Current Ratio, Retained Earning Ratio.*

INTRODUCTION

Dividend Policy is one of the tormenting puzzles in finance. The current earnings, past earnings as well as the dividend payment pattern have always been an indicator of dividend policy of any companies (Lintner 1956). Dividend policy of a firm has implication for investors, managers and lenders and other stakeholders (more specifically the claimholders). For investors, dividends – whether declared today or accumulated and provided at a later date are not only a means of regular income, but also an important input in valuation of a firm. Similarly, managers' flexibility to invest in projects is also dependent on the amount of dividend that they can offer to shareholders as more dividends may mean fewer funds available for investment. Lenders may also have interest in the amount of dividend a firm declares, as more the dividend paid less would be the amount available for servicing and redemption of their claims. The dividend payments present an example of the classic agency situation as its impact is borne by various claimholders. Accordingly, dividend policy can be used as a mechanism to reduce agency costs. The payment of dividends reduces the discretionary funds available to managers for perquisite consumption and investment opportunities and requires the managers to seek financing in capital markets. This monitoring by the external capital markets may encourage the managers to be more disciplined and act in owners' best interest.

Firms of developed markets target their dividend payout ratio with the help of current earnings and past dividends. To achieve such target, various adjustments have been incorporated in the dividend policy of firms and therefore firms should have stable dividend policies (Lintner 1956). Miller and Modigliani (1961) on the other hand feel that dividend policy is immaterial in measuring the current worth of shares considering the irrational assumptions of market perfections, no transaction costs, perfect certainty and indifferent behaviour of investors. Dividend payout

ratio has a positive but insignificant relationship in the case of growth and negative but insignificant relationship in case of market to book value (D' Souza, 1999). Dividend determinants are industry specific and anticipated level of future earnings is the major determinant (Baker et al., 2001).

Over time, the number of factors identified in the literature as being imperative to be considered in making dividend decisions increased substantially. A number of conflicting theoretical models, all lacking strong empirical support, define recent attempts by researchers in finance to explain the dividend phenomenon. But to come out with concrete conclusions, an intensive study of some important factors to describe dividend is very important. This paper analyses the critical factors like current ratio, Retained earning ratio, Price to Book Value ratio and Price Earning ratio on dividend payment of the firms.

LITERATURE REVIEW

The heredity of the literature review relating to factors affecting dividend policy lies in the renowned paper of Lintner (1956) where he discovered that it is the changes in the earnings and the existing dividend rate are the crucial determinants of dividend policy of the firms. After this, another legendary paper came which belongs to Modigliani and Miller (1961). They proved that in the presence of perfect capital market, the dividend decision or the dividend policy of any firm is irrelevant and does not affect the value of the firm. In the last fifty years, the debate on factors affecting dividend policy has created a rich body of literature. Most of the researchers are of the view that the dividend payment enhances the value of the firm but on the other hand, many researches argue that there is a negative effect of the dividend payment on the value of the firms.

The brunt of two kinds of costs – transaction costs and agency costs relative to external financing on the dividend decision of a firm was discussed by Rozeff (1982). He emphasizes that a balance between transaction costs and agency costs will lead to a best dividend policy. Alli, Khan and Ramirez (1993) report that at beta, firm's capital expenditure and financial slack are inversely related to the dividend payout. They find that dividends do not convey information regarding a firm's future cash flows. Mohanty (1999) finds that firms maintain a constant dividend per share and have fluctuating payout ratio depending on their profits. Han, Lee and Suk (1999) examined the dividend policy by considering the institutional ownership under agency cost hypothesis and tax-based hypothesis. They uncovered that tax-based hypothesis is more relevant in the case of institutional investors as they prefer a greater dividend payout.

Anand (2002) contributed for "Factors Influencing Dividend Policy Decisions of Corporate India". In this study, he has recognized the factors that CFOs think in formulating dividend policy of corporate India. According to him, the management of corporate India considers that dividend decisions are vital as they give an indication for the future scenario of the firm and thus influence its market value. They do believe the investors' preference for dividends and shareholder profile while formulating the dividend policy. They also have a target dividend payout ratio but want to pay stable dividends with growth.

According to Baker and Powell (2001) who analyzed the influence of 22 factors in determining the NASDAQ firm's dividend policy, the important determinants, on the basis of response of 188 managers, are pattern of past dividends, stability of earnings, and the level of current and expected future earnings. Ready (2002) has endeavored to reveal the realistic behavior with the help of trade off theory and signaling hypothesis. His study has made it clear that not all the firms consistently pay same level of dividends. Initiators have always paid higher dividend as compared to other payers. Trends in the industry has reflected that higher dividend is paid by the electricity, mining and diversified industry whereas less dividends are paid by the textile industries. Myers (2004) discovers a sturdy support for earnings, profit margin, institutional ownership and debt-equity ratio on the dividend decision.

Kania, S. L and Bacon, F.W. (2005) has explicated about What Factors Motivate the Corporate Dividend Decision? In this study both 'normative' and 'behavioral' approach has been taken into consideration to explain the determinants that affect the dividend policy. The study has taken sample of 542 firms from multinvestor.com that provides financial information of over 10,000 publicly traded companies. The variables that have been studied

for these firms are Dividend Payout Ratio, Return on Equity, Sales Growth, Beta, Current Ratio, Insider & institutional ownership, capital expenditure & EPS growth. One of nine independent variable tested, seven produced the anticipated relationship with the dividend decision and all were significant at it level. Thus the result suggested the payout ratio would be low if the risk of firm is high.

Kumar (2006) examines the connection between corporate governance and the dividends payout policy for a group of Indian corporate firms for the period 1994–2000. He found a positive relationship of dividends with earnings and dividends trends. Debt-equity ratio has emerged as a factor which was negatively associated, whereas; past investment opportunities exert a positive impact on the dividends. Kanwal and Kapoor (2008) examine the dividend policies of companies in the information technology sector in India. They explore various factors such as profitability, cash flows, corporate tax, sales growth and growth opportunities that have an impact over the dividend policies of such companies. They report that only cash flows indicating liquidity and beta indicating risk are the foremost determinants.

Eriotis (2005) adjusts the firms' distributed earnings and size in the Lintner model and found that Greek firms have a long-run constant dividend payout policy. He also reported that an increase in the earnings does not change the dividend distribution pattern of firms. Denis and Osobov (2008) find that the tendency for paying dividends declined for countries such as United States, Canada, United Kingdom, Germany, France and Japan during 1994-2002. They are also of the view that the international evidence does not support the investors' preference for dividend, the signaling and the clientele interpretations as prominent variables. Rather, they go along with the distribution of free cash flow as the chief element of the dividend decision.

Amitabh Gupta and Charu Banga (2010) have reexamined various factors that have an influence on dividend policy of the firms. This particular research has examined many variables in the area of dividend decision which has not done before by any Indian Study. The research study has been done for the period of seven years i.e. Jan 1, 2001 to Dec 31, 2007. This study has taken 15 financial variables to assess the effect of those variables on dividend decisions. The broad areas for these variables were liquidity, financial leverage, ownership, profitability and growth. The result of the regression showed that leverage, liquidity, ownership structure and growth showed expected signs whereas profitability did not behave as expected. Leverage and liquidity, the two factors, were having a strong association with dividend rate of Indian companies but leverage found to be negatively related.

OBJECTIVES OF RESEARCH

Liquidity, the market value of shares and the investment opportunities are also the factors that affect the dividend policy of companies in India. Thus the objectives of this research paper are:

1. To determine association of Current Ratio, Price to Book Value ratio, Price Earning Ratio and Retained Earning Ratio with dividend payout of the companies.
2. To find out the impact of Current Ratio, Price to Book Value ratio, Price Earning Ratio and Retained Earning Ratio on dividend payment of the companies in India.

RESEARCH METHODOLOGY

The main objective of this study is to ascertain impact of some important factors on the dividend decision of companies listed under NIFTY (Nifty-50) for the period 2003-2012. It includes forty three out of fifty companies listed in National Stock Exchange. NIFTY is a stock index that is exceedingly well diversified including 50 stocks which cover companies ranging from 23 diverse sectors of Indian economy. It represents approximately 60 % of entire market capitalization in NSE or 'National Stock Exchange'. The rest seven companies have not been taken for analysis purpose due to lack of required information on the respective variables. The data has been sourced from the PROWESS data source of CMIE. The research is diagnostic and empirical in nature and employs use of

secondary data. Though number of factors influence dividend decision of the business, the following dependent and independent variables which influenced dividend decision of NIFTY during the period of the study i.e. 2003 to 2012 have been selected:

DEPENDENT VARIABLE

Equity Dividend: Equity dividend is percentage paid by the company to its equity shareholder out of the residual profits (Profit after tax and preference dividend). It depends on the development of the turnover and control of the management over the expenditure. It also affects the decision of potential investors regarding investment in company's equity and overall market value of the company's share. Hence, Final Equity Dividend paid by the companies under the study has been used as a dependent variable for the present study.

INDEPENDENT VARIABLES

1. **Current Ratio:** It is calculated by dividing the amount of current assets by current liabilities. The presence of liquidity is considered to be an important factor for deciding the dividend payout of the firm. It is assumed that if this ratio is high there dividend payout ratio is also going to be high.
2. **Retained earnings:** A firm that plans to finance future investment opportunities from retained earnings would distribute lesser profits as dividends. Thus, it is assumed that retained earnings of the current year are negatively associated with dividend paid.
3. **PE ratio:** It is still a debate in corporate finance literature that out of PE ratio and dividend payout ratio, which is the cause and which is the effect. However, in the present analysis a positive relationship between PE ratio and dividend payout has been assumed.
4. **PB ratio:** This is a ratio which is used to compare a stock's market value to its book value. Theoretically, higher the growth opportunities available to a firm is, lower will be the dividend payout. A common proxy used for investment opportunities is (book value ratio) and expected to be negatively correlated with dividend payment.

To test the significance of independent variables (Current Ratio, Price to Book Value ratio, Price Earnings Ratio and Retained Earnings Ratio) in determining dependent variable (Equity Dividend), the following hypothesis has been framed and tested:

H₀ -Independent Variables are not statistically significant in explaining Dividend payment of the companies under the study.

H₁- Independent Variables are statistically significant in explaining Dividend payment of the companies under the study.

SPECIFICATION OF REGRESSION MODEL

The above mentioned independent variables have been taken together as factors that influences dividend decision and the a regression model has been developed in order to analyze whether equity dividend payment of all the companies have been influenced by (independent variables) or not. The model has been anticipated using data of 43 selected companies of NIFTY for a period of 10 years from 2003-2012 based on Multiple Linear Regression consisting of four variables as shown below:

$$Y = \alpha + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4$$

Where, α is the regression constant and b_1, b_2, b_3 and b_4 are regression coefficients respectively.

The regression coefficient indicates the amount of change in the value of dependent variable for a unit change in independent variable. r^2 - the coefficient of determination, gives an estimate of the proportion of variance of dependent variable accounted for by the independent variable. It suggests the covariance between changes in dividend rate and earnings rate. The value of r^2 varies between 0 and 1. An r^2 of zero means that the predictor accounts for none of the variability of 'Y' by 'X'. An r^2 of 1 means perfect prediction of y by x and that 100% of variability of 'Y' is accounted for by 'X'. The higher the value of r^2 , the closer the relationship between the variables.

The variables that have been identified can be stated as follows:

Y= Equity dividend (%)

x_1 =Current Ratio (times)

x_2 = PE Ratio (%)

x_3 = PB Ratio (%)

x_4 = REE Ratio(%)

EMPIRICAL ANALYSIS & FINDINGS

The figure of final dividend paid has been taken into consideration in the period of study. The statistics software SPSS 19.0 have been used for the analyses of the result.

Table 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.413 ^a	.171	.163	21.56637

a. Predictors: (Constant), RRE %, CR , PE ratio , P/B ratio

Table 2 :ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39630.903	4	9907.726	21.302	.000 ^a
	Residual	192554.791	414	465.108		
	Total	232185.694	418			

a. Predictors: (Constant), RRE %, CR , PE ratio , P/B ratio

b. Dependent Variable: Eq_div %

**Table 3 :
Coefficients^a**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	28.789	2.243		12.838	.000	24.380	33.197
CR	-2.050	1.000	-.092	-2.049	.041	-4.016	-.084
PE ratio	.000	.000	-.082	-1.822	.069	-.001	.000
P/B ratio	1.743	.273	.288	6.376	.000	1.206	2.280
RRE %	-.008	.001	-.294	-6.525	.000	-.010	-.005

a. Dependent Variable: Eq_div %

DISCUSSION OF THE RESULT

A deeper look at the R² value reveals that the existing model only explains 17.1 % of the dividend payment pattern of companies under Nifty-50 and assumes a value of 0.171 (Table 1). The value of R² is significant as indicated by the p value (0.000) of F statistic as given in table 2. Thus the null hypothesis has been rejected. Thus, it can be said that independent variables are statistically significant in explaining Dividend payment of the companies under the study. The F value is found to be significant at 5 % level of significance suggesting overall applicability of the existing model.

The estimated regression equation as obtained in Table 3 may be written as:

$$y = 28.789 - 2.050x_1 + .000x_2 + 1.743x_3 - 0.008x_4$$

$$P \text{ value} = (0.000) (0.041) (0.69) (0.000) (0.000)$$

The regression equation indicates that the independent variables i.e. Current Ratio and Retained Earnings are negatively related to equity dividend whereas Price to Book Value ratio is positively related to dividend payment. This is also observed that Price Earning Ratio has no relation with the dividend payment which is quite surprising as it is not true as per literature.

The p value of x₁, x₂, x₃ and x₄ are 0.041, 0.69, 0.000 and 0.000 respectively. The result is significant as far as the three variables x₁, x₃ and x₄ are concerned. But the same is not significant for the variable x₂ as the p value is more than 0.05. The significance of the coefficient is indicated if the p value is less than or equal to the level of significance (alpha), which is assumed to be 0.05 in the present case.

From multiple linear regression model, it is clear that the model has a coefficient of determination of 17.1% which explains 17.1% of variation in Equity Dividend Rate of companies during the study period as shown in Table 1. The model also states that the dependent variable i.e. Rate of Equity Dividend can be predicted from a linear combination of factors affecting dividend decision i.e. Current Ratio (CR), Price Earnings Ratio (PER), Price to Book Value Ratio (PBR) and Retained Earnings Ratio (REE). Coefficients of factors affecting dividend decision propose that each 1 percent change in CR, PBR and REE leads to the highest decrease of 2.050 percent, the highest increase of 1.743 percent, lowest decrease of 0.008 percent in rate of equity dividend. And PER does not affect at all and thus no change in equity dividend payment because of it.

CONCLUSION

The study reveals that apart from profitability there are some more important factors which affect the decision of companies to pay its dividend. This paper has studied four variables namely Current Ratio (CR), Price Earnings Ratio (PER), Price to Book Value Ratio (PBR) and Retained Earnings Ratio (REE) to see its effect on the dividend payment pattern of the companies listed in National Stock Exchange (NSE, Nifty-50). The technique of multiple regression implies that 17% variation has been explained by the independent variables. The result shows that the variables taken under the study are significant and have an impact on the dividend payment pattern of the firms under study. There are many more variables like debt equity ratio, risk factor beta, tax etc. that affect the dividend payment pattern of the companies and can explain the rest of variation i.e. 83%. It is still required to take all the variables together and find out those variables that affect dividend policy of the companies across the globe and are common amongst the various industries.

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AN INTELLIGENT RETRIEVAL RECOMMENDER SYSTEM: DESIGN AND IMPLEMENTATION

Monika Arora¹, Uma Kanjilal² and Dinesh Varshney^{3,4,*}

¹Department of IT, Apeejay School of Management, Dwarka Institutional Area, New Delhi-110075, India

²Department of Library and Information Science, Indira Gandhi Open University Maidan Garhi, New Delhi-110 068, India

³School of Physics, Devi Ahilya University, Khandwa road Campus, Indore- 452001, M. P. India

⁴Multimedia regional Centre, Madhya Pradesh Bhoj (Open) University, Khandwa road Campus, Indore- 452001, M. P. India

ABSTRACT

Recommender systems (RS) are intelligent applications in the field of Information retrieval. IR assist users in a decision making process for choice of one item from an overwhelming set of alternative products or services. The scope of recommender systems has expanded gradually since their first introduction in the mid-1990s. Recommender systems were originally proposed as tools where “people provide recommendations as inputs, which the system then aggregates and directs to appropriate recipients” [3]. This definition refers to the recommender system technology known as collaborative or social filtering, which has the merit of having started the research in the field and has inspired a number of approaches combining the idea of social filtering with other technologies [1, 4]. Research on recommender systems has historically overlapped with many computer science topics, but two main areas initially influenced that research: intelligent information retrieval and artificial intelligence.

From information retrieval, recommendation technology research derives the vision that users searching for recommendations are engaged in an information search process and query a content repository in order to obtain a collection of matching items, typically in the form of a ranked list. From an artificial intelligence perspective, recommendation is viewed as a learning problem that exploits past knowledge about users, such as the search or buying behaviors of a community of users, in order to infer the current user’s interest in items not yet considered. With this early imprinting, many of the first recommender systems were designed to support simple information-search-oriented human-computer interactions where two phases can be identified: user-model construction and recommendation generation. This paper defines the importance of both the model. The user model, a structured description of the user’s needs and preferences, is typically acquired by exploiting either a collection of previous user-system interactions or information provided by the user of the same interest group during the recommendation session. This paper attempts to define a model for considering the factors of intelligent retrieval.

Keywords: Recommender systems , intelligent applications, Retrieval, Filtration

1. INTRODUCTION

An intelligent retrieval consists of sensing element or agents that receive events, and recognizer or classifier classifies them and that determines which event occurred, also a set of logic programs to rule-based inference, and a mechanism for taking action accordingly [1,4]. Other attributes that are important for retrieval paradigm include mobility and learning. An information retrieval searches navigates through a network and perform tasks on remote machines. A learning retrieval adapts to the requirements of its user and automatically changes its behavior in the face of environmental changes. For learning or intelligent retrievals, an event-condition-action paradigm can be defined [2]. In the context of intelligent retrievals, an event is defined as anything that happens to change the environment or anything of which the retrieval should be aware. When any event occurs, the retrieval has to recognize and evaluate what the event means and then respond to it. It also determines what the condition or state

of the world is, could be simple or extremely complex depending on the situation. Recommenders System is an intelligent retrieval application which facilitates information retrieval.

Recommender system technique is a software applications that aims to support the users in their decision-making by interacting with them in large information spaces. These techniques recommend items of interest to users and based on preferences they have expressed (either explicitly or implicitly). The expanding and increasing the data and information on the Web, therefore required such systems which uses tools for users in a variety of information seeking and doing e-commerce activities. Recommender systems is a tool to help and overcome the information overload problem. It exposes users to the most interesting items, and by offering innovation, and significance. Recommender technology is the central piece of the information seeking puzzle. Mostly e-commerce sites such as Amazon and Yahoo are using recommendation technology in omnipresent ways. Also new ventures are on their way as entrepreneurs are competing in order to find the right approach to use this technology effectively. As insist about the focus to the users , it will give rise to socially connected system .i.e. Social Recommender Systems.

The Social Recommender Systems (SRSs) aims to alleviate information overload over social media users by presenting the most attractive and relevant content. Also using personalization techniques specific user have to adapt themselves. recommender systems and Social media can mutually benefit from one other. On the one hand, recommender systems can extensively influence the achievement of social media, ensuring each user is presented with the most attractive and appropriate content, on a personal basis. On the other hand, social media introduces new types of public data and metadata, such as tags, comments, votes, and explicit people relationships, which can be utilized to enhance recommendations. The recommender systems within retrieval works in order to: (1) share research and techniques used to develop effective information retrieval recommenders, from algorithms, through user interfaces, to evaluation (2) identify next key challenges in the area, and (3) identify new cross-topic collaboration opportunities. To take advantage of the WWW setting and its broad and diverse audience, particularly encouraging two research sub-topics of the area recommenders system and social media: 1) rising applications for recommender systems on the Web 2) using new sources of knowledge particularly Big Data generated by community and appliance to enhance current techniques and develop new methods for recommender systems on the Social Web.

2. LITERATURE REVIEW

The World Wide Web has become the primary source of information for all work activities WWW had a huge content and would be wasted if that information could not be found, analyzed, and exploited correctly. Each user is able to retrieve the information quickly and find that information in both relevant and comprehensive for their needs. RS techniques have become a principal driver of innovation and a variety of new techniques. It also have been introduced to cultivated and develop the information based on the base content. Recommender systems are (web, mobile, standalone) tools that are becoming more and more popular for supporting the user in finding and selecting products, services, or information. Basic Concepts in Information Retrieval is the Information Retrieval (IR) deals with the representation, storage and organization of unstructured data. Information retrieval is the process of searching within a document collection for a particular information need (a query). Its mission is to assist in information search. There are two main search paradigms are retrieval and browse. The user Task does retrieval which includes Search for particular information, usually focused and purposeful, Browsing, general looking around for information.

Recommender systems are popular both commercially and in the research community, where many approaches have been recommended for providing recommendations. In many cases a system designer was employed to set a recommendation system and it must choose the best practices between a set of best candidate approaches. A first step towards selecting an appropriate algorithm is to decide upon the properties of the application to focus upon when making choices. Indeed, recommendation systems have a variety of properties that may affect user experience, such as accuracy, robustness, scalability, and so forth. In this paper it is discussed how to compare recommenders based on a set of properties that are relevant for an simple application. It focuses on the implementation of Collaborative Filtering algorithm. This also describes experimental settings appropriate for making choices between algorithms. It also discusses how to draw trustworthy conclusions from experiment. This review a large set of properties, and explain how to evaluate systems given relevant properties. The survey sample

set of evaluation metrics in the context of the property that they evaluate the recommender system. The dataset describes the uses explores the item 1-5.

To aid in consistency among judges, the benchmark for identification of user-intent was the taxonomy of Web search as offered by [17], and further investigated by [18], as illustrated. Informational searches intents is to locate content concerning a particular topic in order to address an information need of the searcher. The content can be in a variety of forms, including data, text, documents, and multimedia. e.g. child labor laws, cake recipes etc. Navigational classification intents is to locate a particular Web site.

Recommender Systems users

The user expects the Min input vs. Max output. Most users are impatient to get results providing just minimal input. Users' preferences are constructive and context dependent. Users want to make accurate choices, i.e., get relevant information items. The goal of a Recommender System is to generate the meaningful likes or recommendations to collect of users with common preferences for items or products. Suggestions for books on Amazon, or movies on Netflix, are real world example using the recommender systems to operation their industry-strength. The design of these recommendation engines depends on the domain. And also their particular characteristics for which the data available. Recommender Systems have evolved to fulfill the natural dual need of buyers and sellers by automating the generation of recommendations based on data analysis. The term "collaborative filtering" was introduced in the context of the first commercial recommender system, called Tapestry[9], which was designed to recommend documents drawn from newsgroups to a collection of users. The motivation was to leverage social collaboration in order to prevent users from getting inundated by a large volume of streaming documents. Collaborative filtering, which analyzes usage data across users to find well matched user-item pairs, has since been juxtaposed against the older methodology of content filtering which had its original roots in information retrieval.

3. LEARNING SYSTEM

The most general setting in which recommender systems are studied is presented in Figure 1. Known user preferences are represented as a matrix of n users and m items, where each cell $r_{u,i}$ corresponds to the rating given to item i by the user u . This user ratings matrix is typically sparse, as most users do not rate most items. The recommendation task is to predict what rating a user would give to a previously unrated item. Typically, ratings are predicted for all items that have not been observed by a user, and the highest rated items are presented as recommendations.

3.1 Collaborative Filtering

Collaborative Filtering (CF) systems work by collecting user feedback in the form of ratings for items in a given domain and exploiting similarities in rating behaviour amongst several users in determining how to recommend an item. CF methods can be further sub-divided into neighborhood-based and model-based approaches. Neighborhood-based methods are also commonly referred to as memorybased approaches [5].

3.1.1 Neighborhood-based Collaborative Filtering

In neighborhood-based techniques, a subset of users are chosen based on their similarity to the active user, and a weighted combination of their ratings is used to produce predictions for this user. Most of these approaches can be generalized by the algorithm summarized in the following steps: 1. Assign a weight to all users with respect to similarity with the active user.

2. Select k users that have the highest similarity with the active user – commonly called the neighborhood.

3. Compute a prediction from a weighted combination of the selected neighbors' ratings.

In step 1, the weight $w_{a,u}$ is a measure of similarity between the user u and the active user a . The most commonly used measure of similarity is the Pearson correlation coefficient between the ratings of the two users [30], defined below:

$$w_{a,u} = \frac{\sum_{i \in I} (r_{a,i} - \bar{r}_a)(r_{u,i} - \bar{r}_u)}{\sqrt{\sum_{i \in I} (r_{a,i} - \bar{r}_a)^2 \sum_{i \in I} (r_{u,i} - \bar{r}_u)^2}} \quad (1)$$

where I is the set of items rated by both users, $r_{u,i}$ is the rating given to item i by user u, and \bar{r}_u is the mean rating given by user u.

In step 3, predictions are generally computed as the weighted average of deviations from the neighbor's mean, as in:

$$p_{a,i} = \bar{r}_a + \frac{\sum_{u \in K} (r_{u,i} - \bar{r}_u) \times w_{a,u}}{\sum_{u \in K} w_{a,u}} \quad (2)$$

where $p_{a,i}$ is the prediction for the active user a for item i, $w_{a,u}$ is the similarity between users a and u, and K is the neighborhood or set of most similar users.

Similarity based on Pearson correlation measures the extent to which there is a linear dependence between two variables. Alternatively, one can treat the ratings of two users as a vector in an m-dimensional space, and compute similarity based on the cosine of the angle between them, given by:

$$w_{a,u} = \cos(\vec{r}_a, \vec{r}_u) = \frac{\vec{r}_a \cdot \vec{r}_u}{\|\vec{r}_a\|_2 \times \|\vec{r}_u\|_2} = \frac{\sum_{i=1}^m r_{a,i} r_{u,i}}{\sqrt{\sum_{i=1}^m r_{a,i}^2} \sqrt{\sum_{i=1}^m r_{u,i}^2}} \quad (3)$$

When computing cosine similarity, one cannot have negative ratings, and unrated items are treated as having a rating of zero. Empirical studies [5] have found that Pearson correlation generally performs better. There have been several other similarity measures used in the literature, including Spearman rank correlation, Kendall's τ correlation, mean squared differences, entropy, and adjusted cosine similarity [18, 12].

Below we discuss several extensions to neighborhood-based CF, which have led to improved performance. Item-based Collaborative Filtering: When applied to millions of users and items, conventional neighborhood-based CF algorithms do not scale well, because of the computational complexity of the search for similar users. As an alternative, Linden et al. [9] proposed item-to-item Collaborative Filtering where rather than matching similar users, they match a user's rated items to similar items. In practice, this approach leads to faster online systems, and often results in improved recommendations [16, 17].

In this approach similarities between pairs of items i and j are computed offline using Pearson correlation, given by:

Item-to-item correlation, given by:

$$w_{i,j} = \frac{\sum_{u \in U} (r_{u,i} - \bar{r}_i)(r_{u,j} - \bar{r}_j)}{\sqrt{\sum_{u \in U} (r_{u,i} - \bar{r}_i)^2} \sqrt{\sum_{u \in U} (r_{u,j} - \bar{r}_j)^2}} \quad (4)$$

where U is the set of all users who have rated both items i and j, $r_{u,i}$ is the rating of user u on item i, and \bar{r}_i is the average rating of the ith item across users. Now, the rating for item i for user a can be predicted using a simple weighted average, as in:

for user u can be predicted using a simple weighted

$$p_{u,i} = \frac{\sum_{j \in K} r_{u,j} w_{i,j}}{\sum_{j \in K} |w_{i,j}|} \quad (5)$$

where K is the neighborhood set of the k items rated by u that are most similar to i .

For item-based Collaborative Filtering too, one may use alternative similarities metrics such as adjusted cosine similarity. A good empirical comparison of variations of item-based methods can be found in [15]. Significance Weighting: It is common for the active user to have highly correlated neighbors that are based on very few co-rated (overlapping) items. These neighbors based on a small number of overlapping items tend to be bad predictors. One approach to tackle this problem is to multiply the similarity weight by a Significance Weighting factor, which devalues the correlations based on few co-rated items [7].

Different choices of loss functions, regularizers and additional model constraints have generated a large body of literature on matrix factorization techniques. Arguably, for discrete ratings, the squared loss is not the most natural loss function. The maximum margin matrix factorization [4] approach uses margin based loss functions such as the hinge loss used in SVM classification, and its ordinal extensions for handling multiple ordered rating categories. For ratings that span over K values, this reduces to finding $K - 1$ thresholds that divide the real line into consecutive intervals specifying rating bins to which the output is mapped, with a penalty for insufficient margin of separation. Rennie and Srebro [4] suggest a non-linear Conjugate Gradient algorithm to minimize a smoothed version of this objective function.

In many settings, only implicit preferences are available, as opposed to explicit like-dislike ratings. For example, large business organizations typically meticulously record transactional details of products purchased by their clients. This is a one-class setting since the business domain knowledge for negative examples that a client has no interest in buying a product ever in the future is typically not available explicitly in corporate databases. Moreover, such knowledge is difficult to gather and maintain in the first place, given the rapidly changing business environment. Another example is recommending TV shows based on watching habits of users, where preferences are implicit in what the users chose to see without any source of explicit ratings.

3.2 Evaluation Metrics

The quality of a recommender system can be evaluated by comparing recommendations to a test set of known user ratings. These systems are typically measured using predictive accuracy metrics [8], where the predicted ratings are directly compared to actual user ratings. Predictive accuracy metrics treat all items equally. However, for most recommender systems we are primarily concerned with accurately predicting the items a user will like. As such, researchers often view recommending as predicting good, i.e. items with high ratings versus bad or poorly-rated items. In the context of Information Retrieval (IR), identifying the good from the background of bad items can be viewed as discriminating between “relevant” and “irrelevant” items; and as such, standard IR measures, like Precision, Recall. These, and several other measures, such as F1-measure, Pearson’s product-moment correlation, Kendall’s τ , mean average precision, half-life utility, and normalized distance-based performance measure are discussed in more detail by Herlocker et al. [8].

$$r_{uj}^* = r_u + K \sum_{v \in N_j(u)} w_{uv} (r_{vj} - r_v) \quad (6)$$

A set of neighbours of u that have rated j

Where, r_u is the average rating of user u , K is a normalization factor such that the absolute values of w_{uv} sum to 1, and

$$w_{uv} = \frac{\sum_{j \in I_{uv}} (r_{uj} - r_u)(r_{vj} - r_v)}{\sqrt{\sum_{j \in I_{uv}} (r_{uj} - r_u)^2 \sum_{j \in I_{uv}} (r_{vj} - r_v)^2}}$$

Pearson
Correlation of
users u and v

(7)

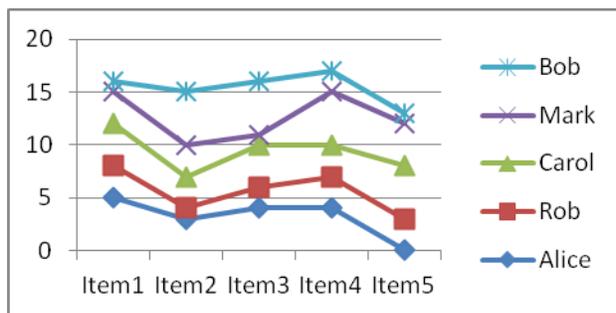
4. DATA INTERPRETATION AND ANALYSIS

The recommendations as inputs, the alice enters the keywords and weights for the results. There are the history data which helps to search for item 5. The numbers indicate the priority of a particular item the based on the random no assigned to each item with respect to their users.

	Item1	Item2	Item3	Item4	Item5
Alice	5	3	4	4	
Rob	3	1	2	3	3
Carol	4	3	4	3	5
Mark	3	3	1	5	4
Bob	1	5	5	2	1

Table 1: User with Item

By using the Pearson correlation ,method which helps in correlation. The recommender system technology known as content repository as follows. Based on the coorelation data the mark should be the nearest neighbour and then the carol. The interest of the rob and carol are somewhat close to the Alice. This means that when Alice is searching for the item 5 .The collection of matching items, typically in the form of a ranked list. From an artificial intelligence point of view This can viewed as a learning problem that exploits past knowledge about users, such as the search or buying behaviors.As we can see from the given scores, users who were looking at the Alice Item Pack would also be interested in a pair of likes Rob and Carol.



5. RESULTS AND CONCLUS

This proposed technique can be a domain-specific IR method combining ranked IR and RSs methods. Experiments with a simulated search environment show that this integration has the potential to improve retrieved results over standard IR methods. While this initial experiment shows promising results, further work needs to be done to develop a more realistic experimental environment. For example, to use a more sophisticated model for query

variations in training the RSs. Additionally, while the results so far are encouraging, there are various ways to improve the baseline IR, including methods such as relevance feedback. In our further work, we will explore integration of methods such as these to compare their contribution to improving IR with that of the recommender based approach.

The scenario we are exploring here considers a searcher exploring a new domain of interest. Thus the searcher has to be exploring the number of items. When doing this the use of feedback as they explore items to adapt the RS in a personalized manner. Also, if they are learning about a new topic, there will often be a preferable order in which information should be viewed. So ultimately we are interested not just in identifying relevant items, but also determining the order in which they are presented in order to maximize the efficiency with which information is provided to the searcher. New evaluation strategies will be required in order to measure the effectiveness with which relevant items can be recommended to the searcher in an optimally efficient sequence. The recommender systems were designed to support simple information-search-oriented human-computer interactions where two phases can be identified: user-model construction and recommendation generation.

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DESIGN AND DEVELOPMENT OF VISION-BASED AMERICAN SIGN LANGUAGE ALPHABETS AUTO RECOGNITION SYSTEM

Aaron R. Rababaah, Anggie Ramirez, Clifton White, Derik Robinson
University of Maryland Eastern Shore, Princess Anne, Maryland, USA
arrababaah@umes.edu, ayramirez@umes.edu, ctwhite@umes.edu, robinsonderik@gmail.com

ABSTRACT

In this paper we propose and develop a system automatic American sign language alphabets recognition. Our motivation stems from the fact the rapidly increasing body-gesture based interactions between humans and between humans and machines. There is a great need for an automatic interpreter that can break the barrier between deaf and mute people from one side and normal people on the other side. Further, many modern intelligent devices can benefit from this technology such as smart TVs, PDAs and robots. Our approach is different from previous work in the sense it provides a multi-color based encoding scheme to establish the different signatures or patterns of the different hand-signs. We use a series of image and vector processing operations in order to transform a visual hand gesture into a spoken letter and displayed text. The domain and scope of this study is the standard American sign language alphabets. The experimental results of the developed system indicate that the system is effective with an accuracy greater than 93%.

1. INTRODUCTION

Purpose of this document is to describe an American Sign Language Intelligence Recognition System, abbreviated (ASLIRS). The project is a design of American Sign Language systems that recognizes and translates physical hand gestures in to readable text displayed on a computer monitor. This document was tested, revamped, and retested by the authors; A. Ramirez, C. White, and D. Robinson. The developmental team consists of three seniors from the University of Maryland Eastern Shore. All three authors are majoring in Computer Science w/ focus in business administration; this project was led by Dr. Aaron Rababaah. The system defined is easily accessible with around the clock access, enabling users to use American Sign Language with universal recognize characters while generating print on a computer monitor and speaking the generated print. Today we have many languages used across nations; especially American Sign Language is on the rise since 2000. If this continues, one would believe that schools will have to alter their curriculum by attempting to fix the increase. We will use our ASLIRS application to help reduce the gap, between the verbally impaired (mutes) and those who don't know American Sign Language. Application development was carried out using an integrated algorithm in Matlab called Intelligence System Integrated Development Environment, abbreviated (ISIDE) which was developed by Dr. Aaron Rababaah at Math/Computer Science Professor at the University of Maryland Eastern Shore. Other applications involved for development were Microsoft Excel and Linux.

2.0 PROBLEM ANALYSIS AND DESIGN SPECIFICATIONS

The difficulty of communication between physically impaired persons that use ASL as their main way of communication and the people who don't know this language is notorious everywhere. ASLIRS is designed to present the first step to close this communication gap we have. In a long term it will allow two people with different communication abilities to be able to interact using technology and mobile applications.

American Sign Language Intelligent Recognition System, abbreviated (ASLIRS). Developed under ISIDE (Intelligence System Integrated Development Environment), developed at UMES by Dr. Aaron Rababaah. The project is a design of American Sign Language systems that recognizes and translates physical hand gestures in to spoken and text displayed on a screen.

3. SOFTWARE DESIGN AND IMPLEMENTATION

3.1 Software Design

Develop an algorithm using ISIDE that would allow the Intelligent Recognition of American Sign Language. The algorithm would first load the image requested, then process the image and finally output in text and speech the ASL letter corresponding to the image. With the use of a black glove with finger-colored tips Red, Green, Blue, Yellow, Cyan for the thumb to pinky respectively, the software with recognize through the developed algorithm the position of each finger, therefore the correspondent letter. We developed a Reference Template that contained the 26 letters in the Alphabet. Each image of each letter contained the ASL sign for the letter with the finger-colored tips. Then we run each image through the algorithm to get the x and y coordinates of each finger-colored tip. After having all the coordinates for the image we save them in a vector, which would store the 26 letter coordinates.

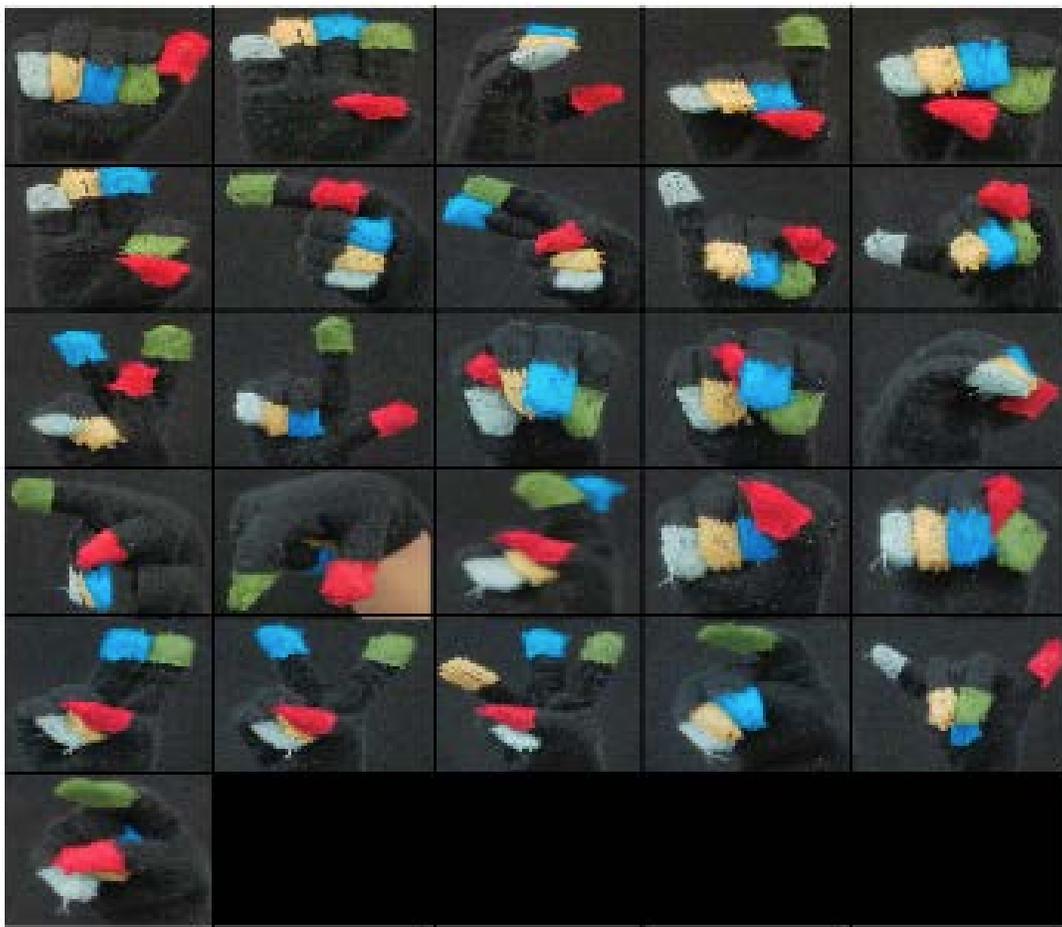


Figure 1: Reference Template for Alphabet Signs. (Images)

The algorithm will use this Reference Template to compare the image that is being processed with each one of the 26 letters saved on the template, to determine which one is the closest match.

	X Coordinate					Y Coordinate				
	R	G	B	Y	C	R	G	B	Y	C
A	1.0000	-0.3820	0.1444	-0.2291	-0.5333	0.7357	0.7443	-1.0000	-0.2829	-0.1971
B	1.0000	-0.4656	0.4832	-0.2249	-0.7927	-1.0000	0.4806	0.3142	0.2274	-0.0221
C	1.0000	-0.3495	-0.0804	-0.1989	-0.3713	-1.0000	0.1575	0.5196	0.2636	0.0593
D	1.0000	-0.5750	0.6448	-0.1946	-0.8752	-1.0000	0.2918	0.1879	0.2949	0.2254
E	0.5948	-0.5690	1.0000	-0.1004	-0.9253	-1.0000	0.2947	0.3351	0.2614	0.1088
F	1.0000	-0.4658	0.5143	-0.2710	-0.7774	-1.0000	0.1174	0.3943	0.3463	0.1420
G	0.0511	-1.0000	0.4439	0.3209	0.1840	0.7766	0.8992	-0.0784	-0.5974	-1.0000
H	0.3972	-0.7014	-1.0000	0.6626	0.6416	-0.0650	1.0000	0.5318	-0.5478	-0.9189
I	1.0000	-0.4342	0.3420	-0.1282	-0.7796	-0.0374	-0.0752	-0.5580	-0.3294	1.0000
J	0.5559	-0.0574	0.4377	0.0638	-1.0000	1.0000	-0.0348	-0.2619	-0.4885	-0.2147
K	1.0000	-0.2860	-0.2162	0.2200	-0.7178	0.4017	-0.5358	1.0000	-0.5018	-0.3641
L	1.0000	-0.3473	0.1039	-0.2547	-0.5019	-0.2642	0.4729	-1.0000	0.0331	0.7581
M	-0.5790	0.0010	1.0000	0.1487	-0.5708	1.0000	-0.4042	0.0548	0.2018	-0.8525
N	0.2100	-0.4331	1.0000	-0.1686	-0.6082	1.0000	-0.1273	0.0906	-0.3296	-0.6337
O	0.8782	-1.0000	0.3135	0.1223	-0.3140	-1.0000	0.4028	0.4523	0.1251	0.0198
P	0.5069	-1.0000	0.5025	0.0759	-0.0853	0.1328	1.0000	-0.4122	-0.3519	-0.3687
Q	1.0000	-0.0023	-0.3326	-0.3326	-0.3326	-0.8909	-1.0000	0.6303	0.6303	0.6303
R	-0.0446	0.1875	1.0000	-0.3041	-0.8388	-0.3141	1.0000	0.9739	-0.7524	-0.9074
S	1.0000	-0.4738	0.4896	-0.1923	-0.8236	1.0000	0.5422	-0.2384	-0.4037	-0.9000
T	1.0000	-0.4616	0.4381	-0.2346	-0.7419	1.0000	0.1158	-0.4099	-0.3506	-0.3553
U	0.3355	-0.4043	1.0000	-0.2203	-0.7109	-0.1039	-0.2580	1.0000	-0.2725	-0.3656
V	1.0000	-0.2344	-0.2605	0.1661	-0.6711	-0.0882	-0.2190	1.0000	-0.3255	-0.3673
W	0.2723	-1.0000	0.8616	-0.4610	0.3271	-0.5482	0.3448	0.8551	0.3482	-1.0000
X	-1.0000	-0.1272	0.8299	0.3044	-0.0072	1.0000	-0.1746	-0.0960	-0.2847	-0.4447
Y	1.0000	-0.2834	0.1165	-0.1363	-0.6968	0.6832	-0.1902	-1.0000	-0.3218	0.8288
Z	0.1659	0.2820	0.7194	-1.0000	-0.1673	-0.5408	0.7287	-0.1609	0.9730	-1.0000

Figure 2: Reference Template for Alphabet Signs (Vectors).

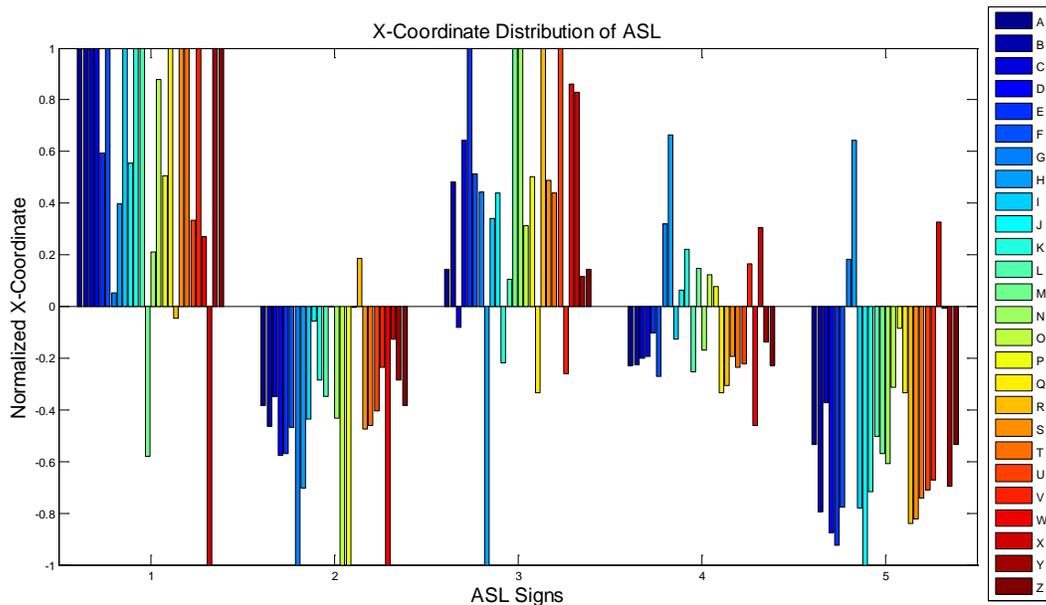


Figure 3: X-Coordinate Distribution of the All Sign

3.2 Implementation

Using ISIDE we developed an algorithm that would process the input image with the use of filters, computes the area and centroid of each color region, which are then saved in the sign vector in the form of x and y coordinates for each finger. Then, the algorithm computes the Euclidean Distance between the current vector and the Reference Template. The smallest distance found is considered the matching sign. The sign is finally spoken and written as a letter by the software.

The first step in the algorithm is to initialize the color vector. This is the vector that contains the RGB values we are going to want to extract from the image using a pixel by pixel analysis. The second step is to initialize the sign vectors to zeros that are going to contain the x and y coordinates of each color segment. The third step is a For loop that is going to compute the vector for each one of the color segments of each finger. First, it would localize each color segment in the image by the given RGB values for the Red, Green, Blue, Yellow, Cyan, using an RGB filter that returns the pixels that are within a 15% tolerance range.

Table 1: RGB Comparison for Color-based Segmentation Filters

	R	G	B
Template	0.9	0.2	0.15
Current	0.81	0.3	0.2
 Distance 	0.09	0.1	0.05

Looking at the table above, we can see how each pixel is being analyzed. For the color Red we chose the values of 0.9, 0.2 and 0.15 for the RGB values respectively. The system will extract the RGB values of each pixel and then compare them with the color template provide them. It will only allow the pixels that are within a 15% tolerance range to appear in the color segment extracted. This process will be repeated for each one of the fingers to get the color segmentation desired. Before the color segmentation can be completed we need to get rid of the noise caused by pixels away for the main color blob. For this, we calculate the area for each color segment and eliminate all the other areas of the same color around it. We now have a more precise color segmentation that is going to allow us identify the location of each color blob.

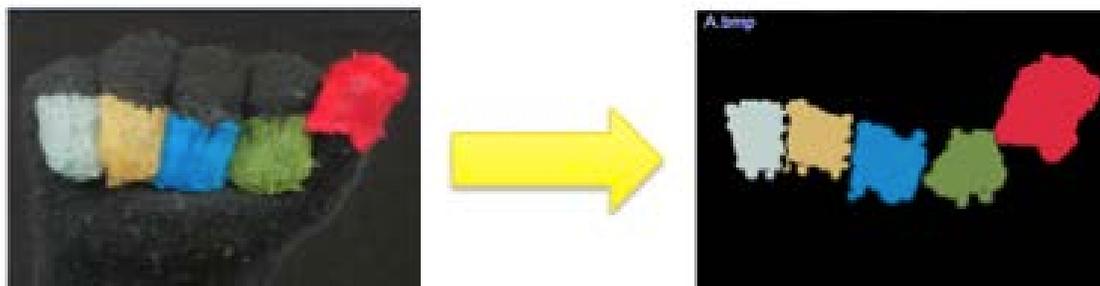


Figure 4: Color Segmentation Example

After the noise has been eliminated, as the area of the biggest color blob is already calculated, we are going to return the centroid in x and y coordinates of each color and save it in the sign vector. The centroid is calculated by finding the mean value for x and y. If a color is not found, both coordinates, x and y are set to zero (0,0). Now comes one of the most important steps in the algorithm, normalization. We need to normalize the sign vector to make each one of the images location and scale independent. This means that if the glove in the image is closer or further away from the camera, or shifted left, right, up or down it wouldn't have any effects on the sign vector.

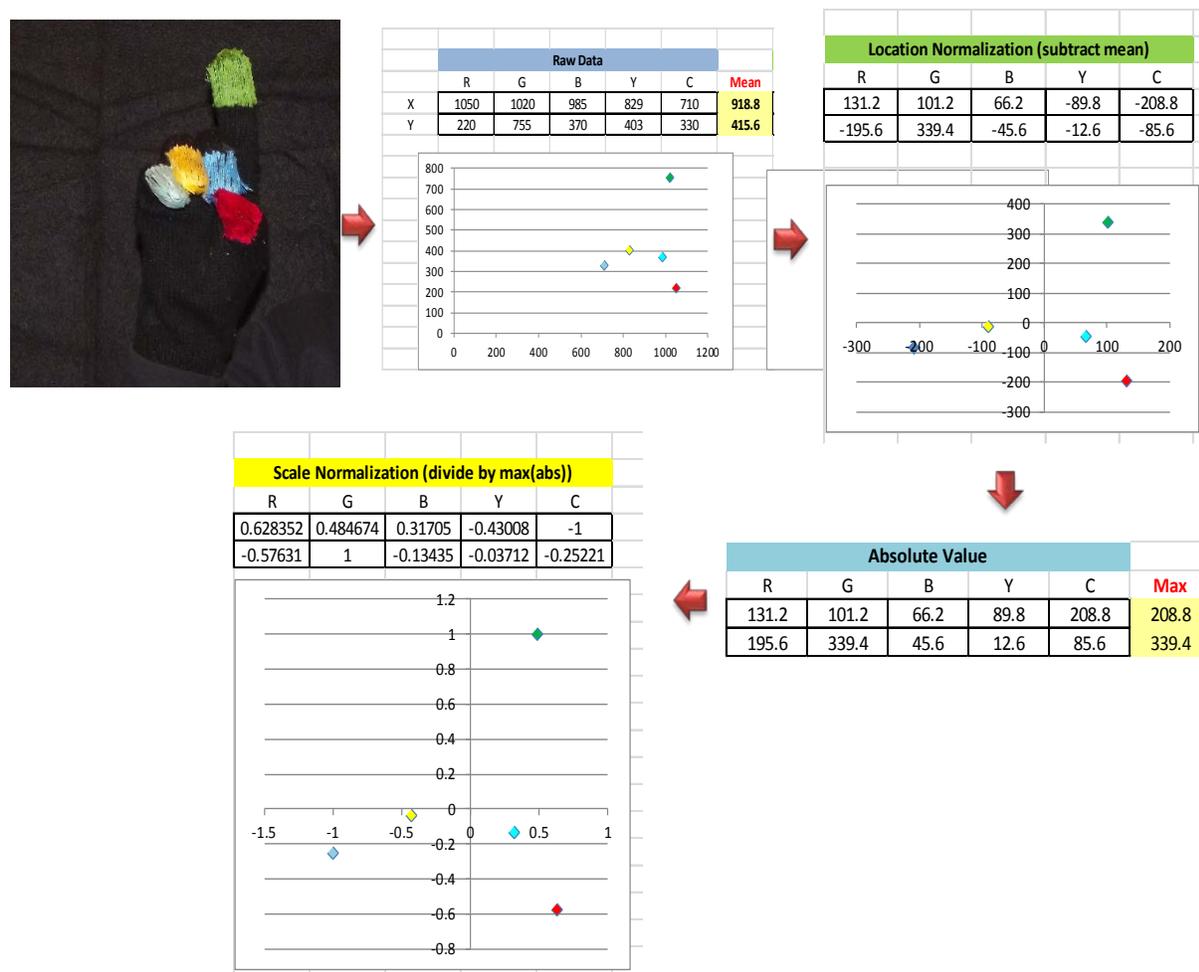


Figure 5: Pattern Vector Normalization Process

To achieve this normalization we apply some basic arithmetic operations to the values in the vector. First we find the mean of the x and y values for the Red, Green, Blue, Yellow and Cyan colors and save it in a variable. To get the localization normalization we subtract the mean from each one of the original values, then save these values in a new vector. This is going to show us how far away each one of the values are from the center of the Cartesian plane created by the finger-colored tips, making it location independent. We now get the absolute value of each one of them and find the maximum value for x and y separately (the maximum value will help us with the scale normalization) and save them in temporary variables. The values we are going to use for the scale normalization are the ones we obtained after subtracting the mean from the original values. Each one of these values we are going to divide it by the maximum value obtained in the previous step.

This division is now going to provide values between -1 (negative one) and 1 (one) only. This will make the values be scale independent because no matter the original scale we get, after the processing they will all be within this range. We now have a location and scale independent vector. This normalized vector is our finalized signed vector and will be compared with the Reference Template. Using Euclidean distances we will compare each x and y coordinate from the signed vector with the

coordinates in the Reference Template vector to find the closest match and fetch the letter. The index of the closest match will be passed to a text to speech function and a write function that will print the letter on the screen.

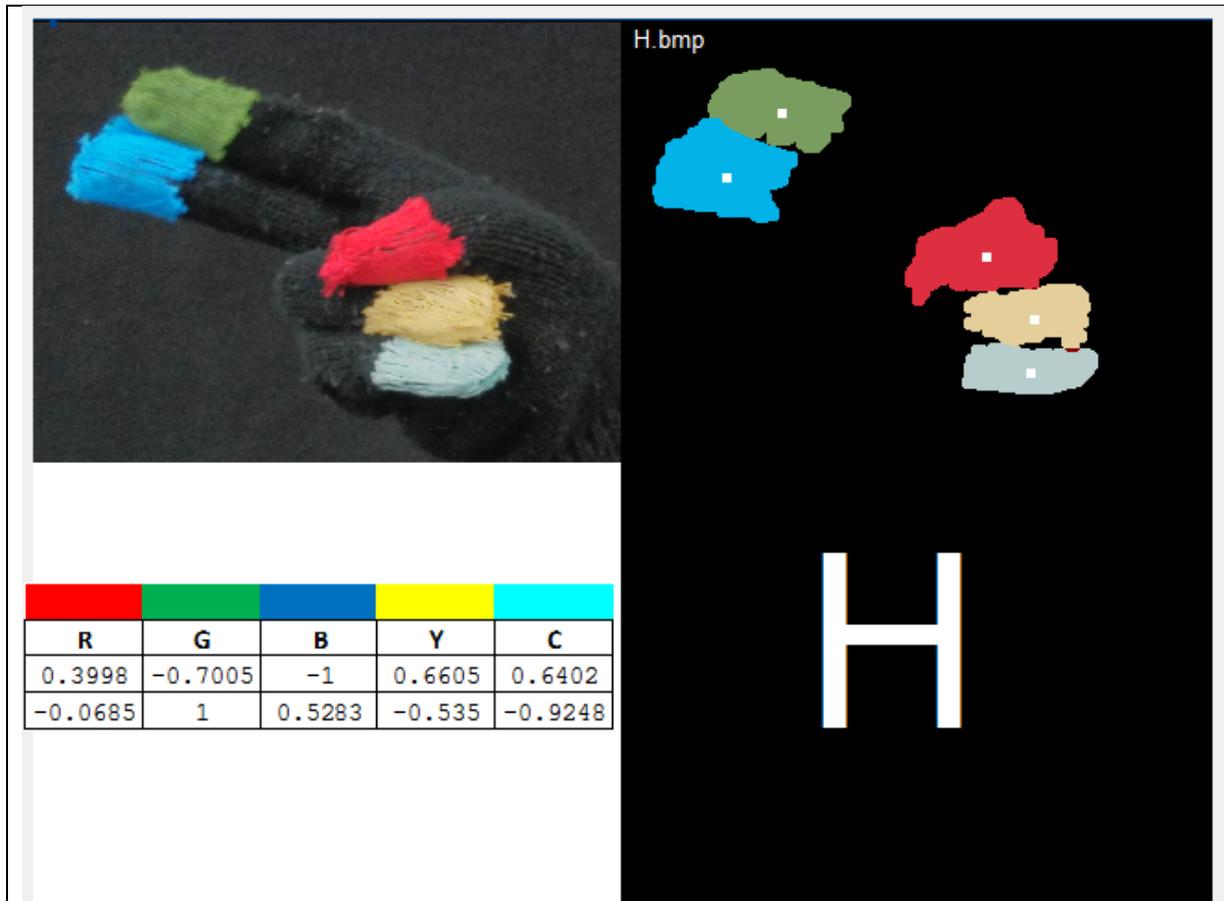


Figure 6: Complete Cycle of One Sign Recognition

4.0 RESULTS AND CONCLUSIONS

We experimented on 76 samples and here is our observations:

- We eliminated 18 samples for very bad resolution and/or extreme tilting.
- If we consider all samples un categorized per letter, ASLIRS was able to recognize 49 out of 58 → letters accuracy of $49/58 = 84.48\%$.
- If we consider category of letters only, ASLIRS was able to recognize 24 out of 26 letters → accuracy of $24/26 = 92.31\%$.
- If we improve and extend our reference template, It is more than likely that the accuracy will be above 95%.
- The sampling synchronization affected the quality of the recorded images.

5.0 FUTURE WORK

Our future work includes the following tasks:

- Create a threshold to reject unrecognizable letters.
- Extend reference template to include numbers 0 to 9.
- Improve glove quality.
- Customizable signs.
- Improve efficiency to create a real-time system.
- Use the ASLIRS software as an educational tool for people who want to learn sign language.

Dedication

We dedicate this research work to Professor Rababaah who never failed to teach, guide us, and mentor us with real yet professional advice. To our families, friends, and classmates who support us in everything, as well as who helped us finished this project, and most of all to the Almighty God who gives us strength and good health while doing this.

Acknowledgements

I have taken efforts in this project. However, it would not have been possible without the upmost support and help of many individuals. I would like to extend my sincere thanks to all of them. Apart from the efforts of myself, the success of any project depends largely on the encouragement and guidelines of Dr. Aaron Rababaah, the developer of ISIDE. I take this opportunity to express my gratitude to the people who have been instrumental in the successful completion of this project. I would like to show my greatest appreciation to Professor Rababaah. I can't say thank you enough for his tremendous support and help. I feel motivated and encouraged every time I attend his courses. Without his encouragement and guidance this project would not have materialized. The guidance and support received from all the members who contributed and who are contributing to this project, was vital for the success of the project. I am grateful for their constant support and help. Thank you Dr. Rababaah, D. Robinson, and A. Ramirez.

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VIBRATION AND ACOUSTIC-BASED ROBOT COMMANDS FRAMEWORK (VAC)

Aaron R. Rababaah¹ and Saed Amer²

¹University of Maryland Eastern Shore, Princess Anne, Maryland, USA

²Tennessee State University, Nashville, Tennessee, USA

arrababaah@umes.edu, samer@tsu.edu

ABSTRACT

In this research work we will present a new method for Man/Machine interaction to develop a vibration-acoustic based commands development. The main concept of this method is to develop signal processing algorithms to handle an encoded signal generated by a user and detected by a vibration or acoustic sensor to interpret the intended command by the user. For this purpose, we developed a binary language that consists of a bit-pattern for each different command. These bit-patterns are then matched with the processed current signal. The current signal is discretized in time and thresholded in amplitude to be transformed into a square-wave which in turns is converted into a bit-pattern. Our experimentation with a real-world robot and vibration sensors strongly supported the validity, effectiveness and efficiency of the proposed VAC method. Our future work will focus on extending this method to include also the acoustic signals as it is one of the most accessible and inexpensive sensing modality.

1.0 INTRODUCTION

Man-Machine Interaction (MCI) is an active research area that is concerned with exploring and establishing methods that humans and machines can interact. Just like man-man interaction there are several ways that we can interact with each other deepening on the situation or the need examples include: direct voice, phone, email, letters, sign language, etc. Man methods have been explored and established for MCI. In this paper we explore a new method of MCI that is based on vibration sensing which can identically be applied to acoustic sensing using identical signal processing theory.

We propose this new method as an alternative way of sending commands to robot in case other methods failed or temporary unavailable. A good example of that situation is military robots deployed in the battle field that need to be tele-operated. The use in this case typically controls the robot using a computer station (PC, laptop or PDA) and wirelessly sends commands to manipulate the robot. In case of the wireless communication fails, acoustic or vibration-based sensing can be used.

We are mainly presenting a new binary-encoded command that we developed to mobile robot [##]. Our objective is to use our proposed VAC method to create behavioral responses that allow the robot to act, state his actions and display his action. This VAC can be generalized to any type of signals, where, temporal response based technique is devised to descriptive and quantize the sampled signal. This architecture of the HCB model will be discussed later.

2.0 THEORETICAL BACKGROUND AND METHODOLOGY

In this section we will present the concept and theory of the proposed method of VAC. In Figure 1, illustrates the proposed process which is the model for transforming the raw signal detected by the sensor(s) into a usable command by the robot. The different stages in this process are discussed as follows:

Event Sensing: the first stage in the process is the event sensing where, a vibrational signal is detected by the accelerometer sensor installed on the robot. The signal is continuously sampled and if a trigger is detected, the processing model is activated.

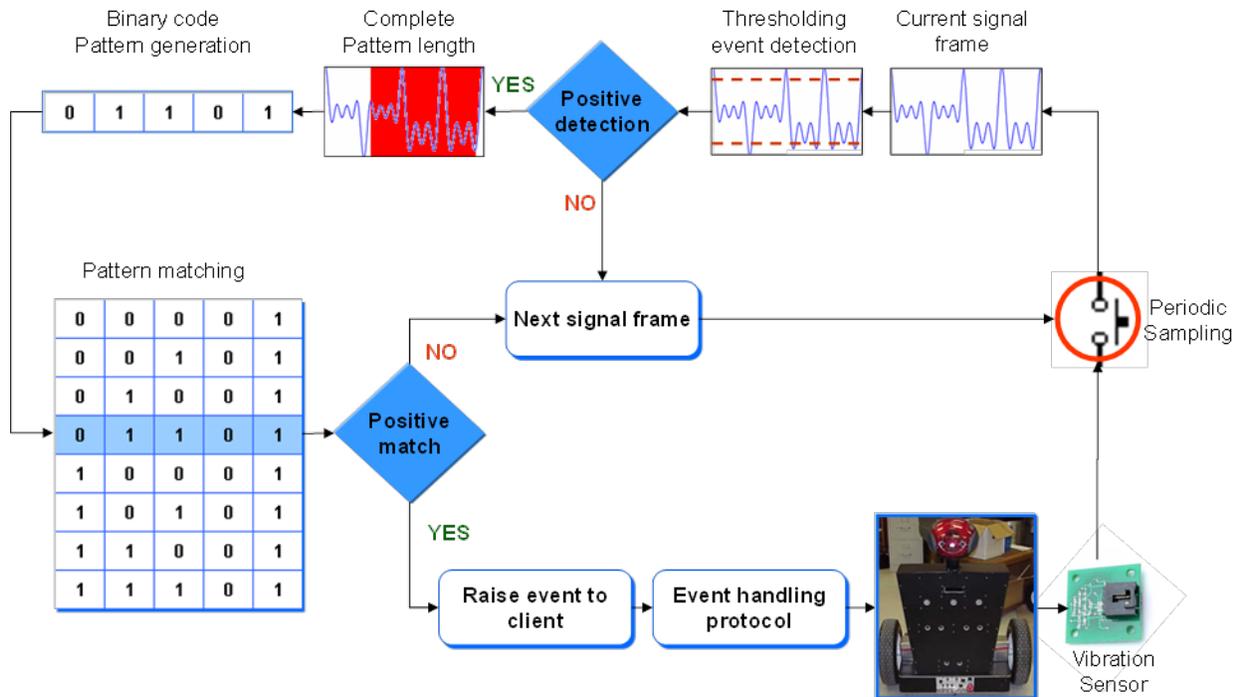


Figure 1: The proposed process model for signal-based HMI

Event Detection: the different event is detected by amplitude thresholding of the sampled signal. Since we are concerned only with the binary pattern representation of the signal, then we designate a fixed time-window for each segment of the signal to be binarized as “1” or “0” based on a threshold parameter that can be calibrated by the operator.

Binary Pattern Generation: once a complete hamming segment length is fetched, the segment is divided into identical sub segments using windowing with window width based on the Hamming-bit length (number of signal samples per window that constitute single bit). For each window, a threshold is applied to detect an event with in the window span. If a window indicates a positive detection, a “high” is assigned to the associated bit in the output VAC pattern, otherwise, a “low” is assigned. This processing scheme is illustrated in figure2 above.

Process Parameters: three parameters control the signal-to-binary pattern transformation process: signal segment length, bit window size, and bit threshold.

Command Pattern Recognition: the transformed signal is tested against pre-registered binary patterns. If a positive identification is been detected, an event is communicated with the robot to take the necessary actions based on the event handling protocol.

Process Cycle Control: the loop between the user and the robot is controlled using two decision points: the first is the input stimuli where, the whole process is activated only if the signal-level is above a calibrated threshold. The

second is the pattern positive match decision where, no action is taken by the robot only if there is match verified between a preregistered table of patterns and the current transformed pattern.

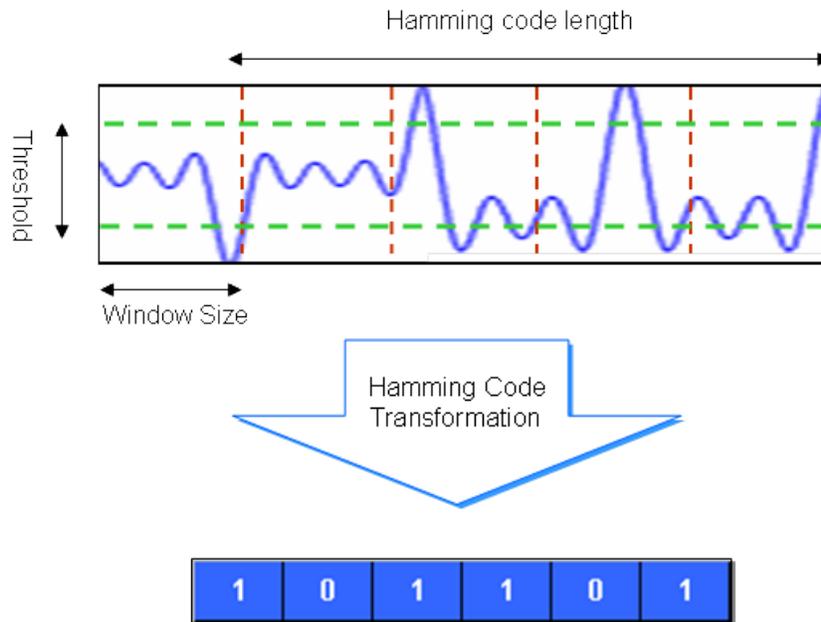


Figure 2: Hamming-code bit-pattern generation technique

The Algorithm of Process: to facilitate the implementation of the described and illustrated process of VAC, we include the pseudo-code version of the algorithm, listed below.

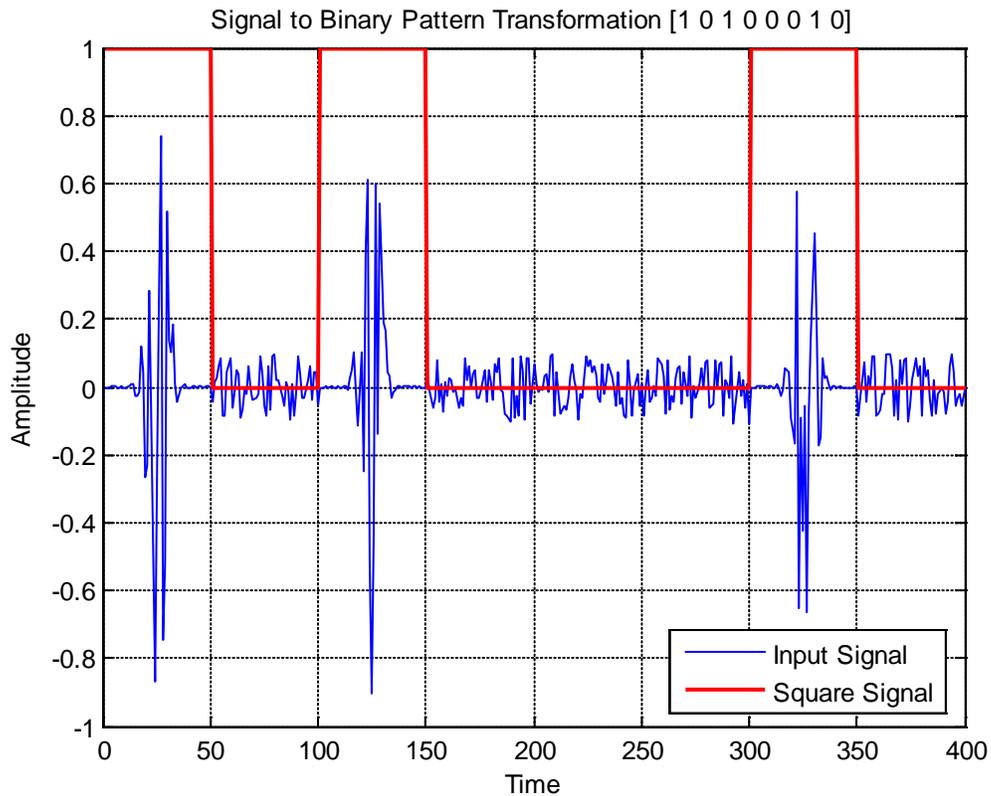


Figure 3: Sample signal transformation to binary bit pattern. The result pattern = [1 0 1 0 0 1 0]

```

VACModel()
{
    While( isVACon )
    {
        While( !eventdetected )
        {
            getNextSensorReading();
            testEventThreshold();
            set( eventdetected );
        }

        signalSegment = sampleCompleteHCBsegment();
        bitPattern = HCBTransformation( signalSegment );
        isMatch = testPatern( bitPattern );

        if( isMatch )
        {
            raiseEventToCleint( patterned );
            callClientDelegate( patterned );
        }
    }
}

clientDelegate( int patternId )

```

```
{  
    switch( patternId )  
    {  
        case 0: behavior0;break;  
        case 1: behavior1;break;  
        case 2: behavior2;break;  
        .  
        .  
        case N: behaviorN;break;  
    }  
}
```

2. TESTING

In testing whether our generated energy action correlated with our pre-registered patterns to produce the movement, verbal and text response behaviors that are incorporated within the robot, we ran several demonstrations to verify that:

- 1) Robot was receiving the generated energy action;
- 2) The generated energy action was being transformed into recognizable Binary-Code;
- 3) The transformed Binary Code was being correlated and matched with the pre-registered patterns; and
- 4) Robot's reaction, verbal and text response behaviors corresponded with the intended command.

Pre-Registered Patterns: three pre-registered patterns are currently registered. These pre-registered patterns allow robot to exhibit certain behaviors based on a generated energy action that produces a vibration pattern that is processed and analyzed as stated above. These pre-registered patterns allow the robot to stop, to move forward and to move backwards depending on the vibration pattern that is generated. They are discussed further below.



Figure 3: Vibration Pattern that corresponds with Hamming Code "1 1 1"

Stopping Behavior: The pre-registered pattern of stopping is "1 1 1." This means that when The robot receives a generated action energy that produces a vibration pattern that corresponds with the Hamming Code for "1 1 1", then the robot will announce that he is stopping, display on the LCD that he is stopping and stop. Please note that all of these behaviors are simultaneous.

Moving Forward Behavior: The pre-registered pattern for the robot to exhibit the behavior of moving forward is “1 0 1.” This means that when The robot receives a generated action energy that produces a vibration pattern that corresponds with the Hamming Code for “1 0 1”, then The robot will announce that he is moving forward, display on the LCD that he is moving forward and began to move forward. Please note that all of these behaviors are simultaneous.

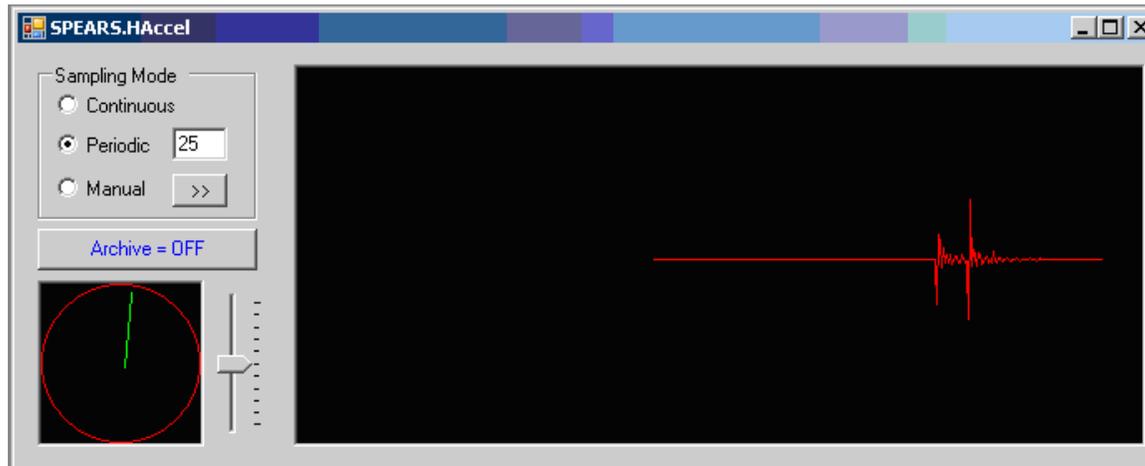


Figure 4: Vibration Pattern that corresponds with Hamming Code “1 0 1”

Moving Backwards Behavior: The pre-registered pattern for The robot to exhibit the behavior of moving backwards is “1 1 0.” This means that when The robot receives a generated action energy that produces a vibration pattern that corresponds with the Hamming Code for “1 1 0”, then The robot will announce that he is moving backwards, display on the LCD that he is moving backwards and began to move backward. Please note that all of these behaviors are simultaneous.

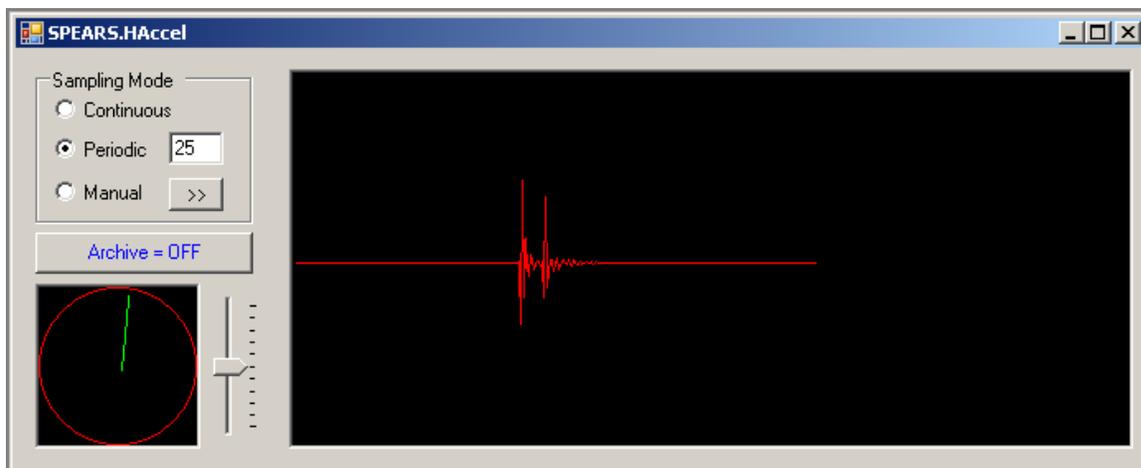


Figure 5: Vibration Pattern that corresponds with Hamming Code “1 1 0”

Test Results: All of our tests indicate that when the robot receives generated action energy that produce vibration patterns that correspond with the Hamming Codes “1 1 1”; “1 0 1”; and “1 1 0”, the robot does exhibit the

expected behavior accordingly. Please note that the pre-registered patterns that the robot can have are expandable. This means that with on-going research that the robot can exhibit more behaviors that allow him to become fully integrated into the environment in which he is being used.

3. CONCLUSION AND FUTURE WORK

Our objective was to use our proposed concept of VAC to create behavioral responses that allow a robot to act, state his actions and display his action. Based upon our test results, we successfully achieved our objective. The robot is now able to respond to outside generated responses that create vibration patterns. However, users must be trained to accurately and consistently generate the pattern that corresponds with the specific behavior that the robot is able to exhibit. Further, on-going research will allow us to expand the robot's ability to include more patterns, explore more modalities and process this information into behavior indices that allow the robot to fully integrate into the environment in which he is being used.

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STUDENTS' ROBOTICS COMPETITION EXPERIENCE AT THE ANNUAL ARTSI CONFERENCE

Aaron R. Rababaah, Gurdeep S. Hura, Lindsei Berman, Josh Nwogu, Esther Nwogu
University of Maryland Eastern Shore, Princess Anne, Maryland, USA

arrababaah@umes.edu, gshura@umes.edu, Imberman@umes.edu, jonwogu@umes.edu, eonwogu@umes.edu

ABSTRACT

We present in this paper the contribution of our students in the annual ARTSI (Advancing Robotics Technology through Societal Impact) competition and conference. A new group of students participated this year at different levels of challenges and tasks. The paper includes detailed descriptions of all tasks attempted and their training, preparation and approach to the different solutions. Pseud-codes. Real codes for the algorithms used in the actual solutions for the competitions will be presented and discussed. Further, challenges and lessons learned throughout the experience will be discussed as will so future teams may be inspired and may learn from their experience to better their contributions in future ARTSI or other competitions.

4. INTRODUCTION

The ARTSI (Advancing Robotics Technology for Societal Impact) Alliance is a collaborative education and research project designed to increase the number of African Americans who study computer science and robotics in college. This project also aims to increase the amount of HBCU faculty who educate students in robotics and robotic research. It is led by Spelman College, a historically black college for women, and several other HBCUs and Research I institutions [ARTSI Alliance, 2008]. This event tests the programming and technical skills of students from different HBCU's and prospering universities from all over the United States and helps to promote role modeling and mentoring in the robotics education and research.

The competition is split into two parts, consisting of the robotics competition and the Computer Science Olympiad. This year, it was hosted by Morgan State University, one of the fellowships HBCU's involved in the project, and was organized into two days of educational computing fun. Each year, participating students are required to form groups of no more than four students, containing one senior and one female student. Each group is given three tasks to complete in the first event of the competition which are designed to test the students programming and logical skills using the Tekkotsu programming environment and the Calliope robot. This year, Task A required students to program their robot to trace out a five-pointed star with 1 meter long legs. Task B involved programming the robot to walk around a cube in a clockwise direction to read and pronounce AprilTags from each side of the cube; and task C required that the students design a mirage environment in which, their calliope robot moved around on a C shaped platform and simulated the action of pushing objects off of the platform without falling off of the platform itself.

The two days of the competition were full of fun, interactive events to help show the benefits and fun of learning robotics, computer science and engineering. One of the events that happened on the second day of the competition, was one that really brought to like reasons for pursuing a career in these fields. This event was a REU/graduate school seminar where many different prestige professors promoted the importance of technology, robotics undergraduate research experiences, and the benefits of continuing on to graduate school. This opportunity allowed for many students to ask questions they had about grad school or REUs and help to pursued many students to go to grad school. Once the seminar was finished, it was time to start the final session of the ARTSI robotics competition, Task D. This year Task D required that participating students must program their Calliope2SP robot to locate three color cylinders, that are scattered around a 1 meter by 2 meter rectangular arena. Once it located each cylinder it would have to pick it up using the robot's gripper and then transport the cylinder to a 2X2 foot box below an AprilTag. Each team was given two chances to fully complete the task and was then judged against the progress of other teams. Once all of the team were judged and scores were recorded the Computer Science Olympiad began and continued for the rest of the day until the awards ceremony began.

2.0 THE ARTSI ROBOTIC COMPETITION SPRING-2013

When our team first started training and preparing for the competition, many of us had little to no experience with the Tekkotsu development environment or Calliope2SP robot at all. Many nights of training, were spent getting to know the Tekkotsu environment from and Calliope2SP robot, and trying understand how we were going to use them in the competition. Once most of the group had a firm understanding of the Tekkotsu and Calliope2SP robot, it was time to start formulating solutions for each task that was given to us online.

2.1 Task A: Tracing A Star Shape

For Task A (Figure 1), we were required to program the Calliope2SP robot to trace out a five-pointed star, with 1 meter legs, by making a series of forward motions and turns. We were required to have the robot start out facing “north” (towards the top tip of the star) and that it should end up back at that same starting location, again facing “north”.

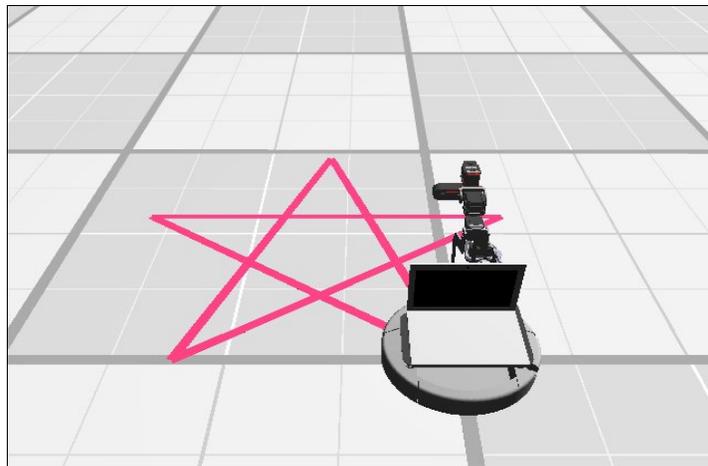


Figure 1: Task A – Traversing a Star

Our approach at this task was to first make a mirage environment that contains a star, like the one required, and to simulate the proper forward motions and turns that we would need to perform to complete this task. We created this mirage environment by writing an .ian file that contains line shapes, their X,Y,Z positions in the mirage environment and other characteristics needed to create the 5-point star.

Next, we began programming the Calliope2SP robot to follow the lines in the star by telling it to move forward 1000 pixels and then make a 135 degree left turn. We repeated these two behaviors until the robot was back to its initial location and facing north as instructed. This is show in a sample of our code below.

```
#include "Behaviors/StateMachine.h"
$nodeclass ARTSI_Task_A : VisualRoutinesStateNode
{
  $nodeclass Forward1000 : PilotNode(PilotTypes::walk) : doStart
  { pilotreq.dx = 1000; }
  $nodeclass Turn20 : PilotNode(PilotTypes::walk) : doStart
  { pilotreq.da = M_PI/9; }
  $nodeclass Turn135 : PilotNode(PilotTypes::walk) : doStart
  { pilotreq.da = M_PI - (39*M_PI/180); }
  $setupmachine
  {
    Forward1000 =C=> Turn135 =C=> Forward1000 =C=> Turn135 =C=> Forward1000 =C=> Turn135
    =C=> Forward1000 =C=> Turn135 =C=> Forward1000 =C=> SpeechNode("done")
  }
}
REGISTER_BEHAVIOR(ARTSI_Task_A);
```

Figure 2: Code for TASK_A Algorithm

Not to our surprise the physical robot indeed followed the commands we wrote when run in the mirage, but when testing on a physical drawn star it lacked in performance. So, went back into the code and choose different forward motions, and turns until we were able complete the task properly.

2.2 Task B: Drive Around A Cube

Next, for Task B, we were required to program our Calliope2SP robot to walk around a four sided cube, in a clockwise direction, and read/speak the tag number of each Apriltag that was placed on each side.

To make the robot complete these behaviors, we designed the robot to again, start at an initial location 1 meter away from the first point where it would read a tag. We then programmed it to move forward that 1 meter, read the tag, pronounce it and then turn ninety degrees to its left. Once the robot was turn to the left, we calculated that the next turn point would be about $\frac{1}{2}$ of the size of the cubes side plus 1 meter, to give the robot room to read the Apriltag through the camera, and trace out a square on the outside of the physical cube. We continued to use 90 degrees for each of our turns but found that when the robot was on tiled floor it seemed to slip off course slightly so we had to enforce different types of turns and forward motions in order to compensate for this issue. We were finally able to read all four tags properly, after trying different turns and motions, and finished the task given.

2.3 Task C: Mirage Simulator

For Task C, we were required to design a “mirage world where a robot rolls around on a C-shaped elevated platform, 500mm off the ground, and objects of different shapes are present on each segment of the C”(ARTSalliance,2008). The objective of this task was to program a simulated robot to push the placed objects off of the platform without falling off of the platform itself (Figure 3).

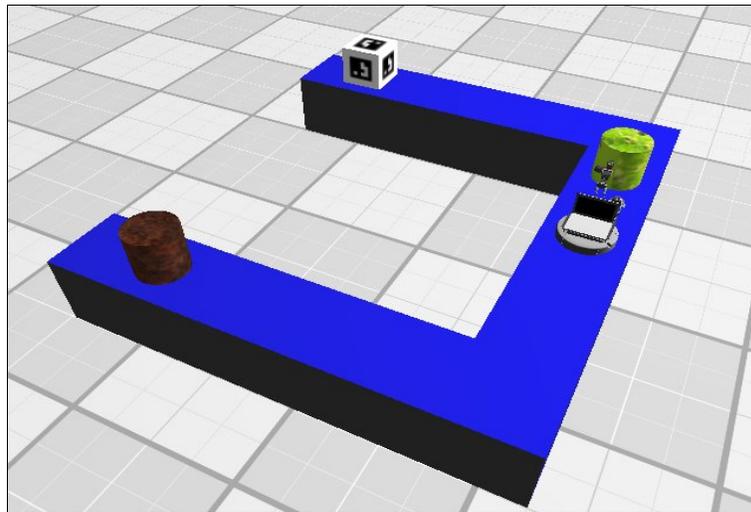


Figure 3: Task C – Mirage Simulator

Our approach to this task, began by formulating a “blue print” of our mirage environment in which, the platform could be wide enough for the robot to turn, move and sit without falling off. After many different guesses, we decided that each leg of the platform would be pixels long, 500 pixels high, as directed by the competition, and pixels wide. For the initial location of the robot we choose to place it in the bottom right corner of platform, with it facing one of the objects, to help prevent the robot from having to reverse to knock off an object. Once we had the overall design of the platform we add some cubes with 0.1 mass and continued on to our design our routine strategy.

Our routine is pretty simple as shown above, because all we had to do was tell the robot to move forward about the length of the right leg, turn to the left, move forward again, turn left again and then move again. Because of the overall speed of the robot it took us a little bit longer than expected to get the robot to perform proper (ie. Knock off all the objects without falling) but eventually we were able to finish it. To complete this task, we also had to use a special command in the terminal that looked like `./tekkotsu-CALLIOPE2SP -c mirage.plist Drivers.Mirage.InitialLocation.2=500`. We had to use this because the robot is originally placed in the mirage environment at z-index 0, but since our platform is 50 pixels tall we want the robot to be placed on top of it, so we use this command to help with that. Once we were able to see the robot we ran the Tekkotsu code and were able to make the robot punch the cubes off of the platform without it falling off the platform itself.

```
#include "Behaviors/StateMachine.h"
$nodeclass XPilot : StateNode
{
    $provide float LEFT(M_PI/2);
    $provide float RIGHT(-26*M_PI/45);

    $nodeclass MoveBy(float usrdx) : PilotNode($, PilotTypes::walk) : doStart{
        pilotreq.dx = usrdx;
        pilotreq.collisionAction = collisionIgnore;
    }
    $nodeclass TurnBy(float usrda) : PilotNode($, PilotTypes::walk) : doStart{
        pilotreq.da = usrda;
    }
    /*$nodeclass Forward3000 : PilotNode(PilotTypes::walk) : doStart{        pilotreq.dx = 3000; */
    $setupmachine{
        pilotStart: MoveBy($, 3200) =PILOT=> TurnBy($,(-7*M_PI/12))=PILOT=>
        MoveBy($,2900)=PILOT=> TurnBy($,(-103*M_PI/180))=PILOT=> MoveBy($,2900)
    }
}
REGISTER_BEHAVIOR(XPilot);
```

Figure 4: Code of Task C

2.4 Task D: Vision and Robotic Arm

Finally, the final task was Task D, was completely optional and only a small amount of student teams attempted it. In this task, students were required to program their Calliope2SP robot to locate 3 colored canisters, placed in a 1 meter by 2 meter rectangular arena, pick the canisters up with its gripper and transport them to the goal location. The goal location was defined by a 2X2 foot box that was centered below an special AprilTag. Each cylinder that is picked up had to be placed inside the goal location within 5 minutes.

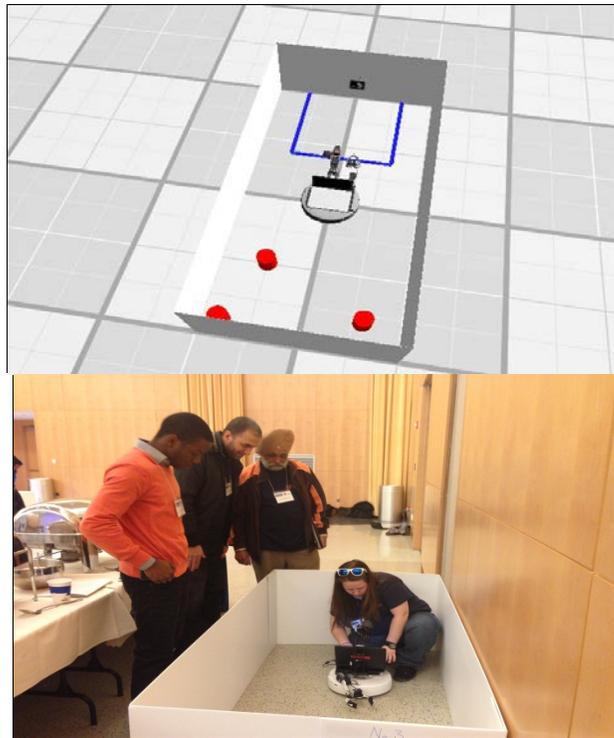


Figure 5: Task D – Vision and Robotic Arm

Originally, our team did not plan to participate in this task but with a little faith each team member decide to at least attempt the task to see how far we could push ourselves to win and not go home with a prize.

Our approach to this task was very rough and not very well thought out. At first, our initial goal was to just have the robot recognize one colored canister, pick it up, turn around and move straight back to its initial starting point, assuming the goal was the same place. We started by trying to find something colorful that the robot's camera would recognize and we ended up using two sierra mist bottles filled with water, in which the robot's camera could view by the bright green color on the cap. We then moved on to added a few lines of code to a sample code, given to us on the ARTSI website, to make the robot sense the bottle, move forward, open its gripper and then close its gripper when it got to the bottle. We were able to get all of these routines working but we still had to make the robot turn around and go back to its start location.

On our first few attempts, we tried telling the robot to turn a complete 180 degrees, to be facing back toward its initial location/goal location, but these attempts seemed to be hopeless as every attempt at the turn was either too short, or it was too long, or it just didn't want to turn at all. So we came up with an idea to split the large turn into several consecutive turns and it finally worked. Once the robot was picking up the canister all we had left in our plan was for it to move forward to the goal location, and open its grippers to drop the canister. So we told the robot to move forward the same distance it traveled toward to collect the canister and it worked. We looped these routines 4 times, just enough for the robot to pick up all 3 canisters, and then stopped the robot.

Unfortunately, we found that this method only worked if the robot chooses to pick up the middle canister first but both times we were judged it went after the right canister instead so we weren't able to get all three canisters in the goal location. However, we were still able place one whole canister in the goal location with one canister placed on the line of the goal, which didn't count so we didn't place in this task, but at least participated.

3. RESULTS AND CONCLUSION

After, all the hard work, lost hours of sleep and dedication all of our team members were able to go home with two certificates of participation or completion, for completing all 3 basic tasks and participating in task D of the competition. We were also rewarded with 8GB flash drives for participating in task D and we congratulated on our efforts throughout the day. This competition was a great experience for both students with robotics background and those with none. It is full of fun tests that will test your agility, determination and brain power and has educated many student from around the country in areas they may have only dreamed of participating in. Both days of the competition were full of useful information like undergraduate research experience information and graduate school facts. It was both remember-able and a huge learning experience for all of us and we look forward to participating in next year's competition, hopefully winning a bigger prize than this year, and attracting more minds of intellectual students to convince them to pursue a passion in robotics, programming and engineering.



Figure 6: Awards Sample at the Award Ceremony

ACKNOWLEDGEMENTS

We want to thank NSF for providing funds to hold competitions like the ARTSI robotic competition and undergraduate research experience for college students all over the United States. With your help many students have been exposed many different learning environments and areas of studies that may not be offered at those students universities. With your help many more students have gains an interest in robotics, to make a difference in the world and we thank you. Next, we want to give thanks to the ARTSI administration, especially Dave Touretzky who designed the Tekkotsu robot programming framework, for formulating and designing this wonderful competition and allowing students from around the US to further their knowledge of robotics, programming and engineering, and to help educate students, not only in your own universities but in many others, the concepts of robotics, engineering and programming. Next, We would also want to thank our university, The University of Maryland Eastern Shore, for having such an amazing math and computer science department that helped us to be educated in software design, computer programming and robotics. Finally, we want to thank our robotics advisers, Dr. Aaron Rababaah and Dr. Gurdeep Hura for all the support, training and coaching that

you have given us during our preparation and participation time in the competition. Finally, we would like to thank past members of our robotics group who helped us to understand some things that may have confused us. Without all of you guys, we may have never had this experience, passion and drive for robotics and we thank you for all your hard work and dedication to help further and create many new opportunities for our futures and fellow students like us.

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Covariance Patterns of the Commodity and Equity Markets: A Recent Surprise

Vichet Sum, University of Maryland Eastern Shore (vsum@umes.edu)

ABSTRACT

This paper is set up to dissect the covariance patterns of the returns on the commodity and equity markets. Analyzing monthly return data from 1970:M1 to 2013M7, the results show that returns on the commodity and equity markets co-vary weakly in the opposite direction ($r = -0.12$) in the 1970s, move together in the same (weakly positive) direction ($r = 0.18$) in the 1980s, then journey in the slightly opposite ($r = -0.08$) direction again in the 1980s and run together in the weakly positive ($r = 0.19$) direction again in the 2000s. Then here comes a surprise, in the last 3.5 years (from 2010 to 2013M7), there is a significantly positive surge ($r = 0.793$) in the covariance between the returns on the commodity and equity markets. The OLS estimates show that return on the stock market can significantly ($r^2 = 0.63$) explain the return variability of the commodity market in the 2010s comparing to other periods.

JEL Classifications: G10, G12, G14

Keywords: covariance, stock market, commodity market, surprise

INTRODUCTION

There has been an increasingly significant interest to investigate the behaviors and relationships of various capital and real markets. Knowledge of different interactions across markets is useful for intertemporal risk management and asset allocations. For example, there is a low correlation between stock and bond returns (Campbell & Ammer, 1993). Another study by Kwan (1996) reports a negative relationship between cross-sectional stock and bond returns. In addition, Sum (2013) provides evidence on the positive link between equity market and commercial paper market. Many other studies have documented the inverse relationship between oil and stock markets. For instance, Kling (1985) shows that prices of crude oil and stock market are negatively related; similar finding is reported by Kaneko and Lee (1995). The negative effects of oil price innovations on real equity market returns in the United States, Canada, United Kingdom and Japan are reported in a study by Jones and Kaul (1996). Sadorsky (1999) examines the covariance of real stock returns, oil price behavior and interest rate and report that oil price significantly forecasts the error variance of real stock returns. Moreover, Driesprong, Jacobsen and Maat (2008) show that returns on equity markets in both developed and emerging markets are negatively related to oil prices. Oberndorfer (2009) documents a negative relationship between European utilities common stocks and oil price. An inverse relationship between interest rate and bank stock returns has also been empirically documented (Chance & Lane, 1980; Flannery & James, 1984; Lloyd & Schick, 1977; Lyngne & Zumwalt, 1980); there is a significantly negative relationship between returns on bank stocks and interest rates (Choi & Elyasiani, 1997; Allen & Jagtiani, 1997; Flannery, Hameed, & Harjes, 1997; Elyasiani & Mansur, 1998; Benink & Wolff, 2000; Mei & Wang, 2000). The linkage between the movement of exchange rates and returns on bank common stocks has been investigated. Choi, Elyasiani, Kopecky (1992) report a negative association between returns on bank stocks and exchange rate shocks. Kasman, Vardar, and Tunc (2011) also find a negative association between returns on bank stocks and exchange rate.

Although an extensive host of research has examined the behaviors and relationships of various capital and real markets, the linkage between commodity and stock markets is not widely studied. Consequently, the current study is set up to dissect the covariance patterns of the returns on the commodity and equity markets. A major contribution of this study is to provide empirical evidence of a significantly positive surge in the covariance between commodity and stock markets in recent years. This study is needed because it adds important information

to the understanding of the covariance patterns of commodity and stock markets. The results are also useful for investment, asset valuation, asset allocation and risk management.

METHOD AND DATA

The objective of this paper is to dissect the covariance patterns of the returns on the commodity and equity markets. To achieve this objective, the covariance (equation 1) and normalized covariance (correlation coefficient) (equation 2) are computed to determine how commodity and stock markets co-vary and correlate in each period. In addition, the ordinary least squares (OLS) regression (See equation 3) is utilized to analyze if stock market return can explain the commodity return variability in each period. The monthly return data are extracted from Global Financial Data; the data are spanning from 1970M1 to 2013M7.

$$\sigma_{COMM \cdot SP} = \frac{1}{n} \sum_{i=1}^n \frac{1}{n} \sum_{i=1}^n (COMM - \overline{COMM})(SP - \overline{SP})$$

$$\rho_{COMM \cdot SP} = \frac{\sigma_{COMM \cdot SP}}{\sigma_{COMM} \sigma_{SP}}$$

$$COMM_t = \alpha + \beta SP_t + \epsilon_t$$

Where

COMM = return on the S&P GSCI (This index tracks commodity market performance)

SP = return on the S&P 500

\overline{COMM} = mean return on the S&P GSCI

\overline{SP} = mean return on the S&P 500

$\sigma_{COMM \cdot SP}$ = Covariance of *COMM* and *SP*

$\rho_{COMM \cdot SP}$ = normalized covariance (correlation coefficient) of *COMM* and *SP*

σ_{COMM} = Standard deviation of *COMM*

σ_{SP} = Standard deviation of *SP*

RESULTS

Various descriptive statistics of the variables are described in Table 1. As shown in Figure 1, the returns on the commodity and equity markets co-vary weakly in the opposite direction ($r = -0.12$) in the 1970s, move together in the same (weakly positive) direction ($r = 0.18$) in the 1980s, then journey in the slightly opposite ($r = -0.08$) direction again in the 1980s and run together in the weakly positive ($r = 0.19$) direction again in the 2000s. Then here comes a surprise, in the last 3.5 years (from 2010 to 2013M7), there is a significantly positive surge ($r = 0.793$) in the covariance between the returns on the commodity and equity markets. The OLS estimates show that return on the stock market can significantly ($r^2 = 0.63$) explain the return variability of the commodity market in the 2010s comparing to other periods (See Table 2).

Table 1: Descriptive Statistics

Periods/Variables	Mean	Median	Standard Deviation	# of Months
Panel A: 1970M1-1979M12				
S&P GSCI	1.80	1.60	6.15	120
S&P 500	0.57	0.36	4.61	120
Panel B: 1980M1-1989M12				
S&P GSCI	0.92	0.64	3.97	120
S&P 500	1.46	1.61	4.73	120
Panel C: 1990M1-1999M12				
S&P GSCI	0.44	0.43	5.07	120
S&P 500	1.48	1.68	3.87	120
Panel D: 2000M1-2009M12				
S&P GSCI	0.68	0.59	7.30	120
S&P 500	0.03	0.74	4.65	120
Panel E: 2010M1-2013M7				
S&P GSCI	0.36	1.20	5.63	43
S&P 500	1.23	1.57	4.18	43

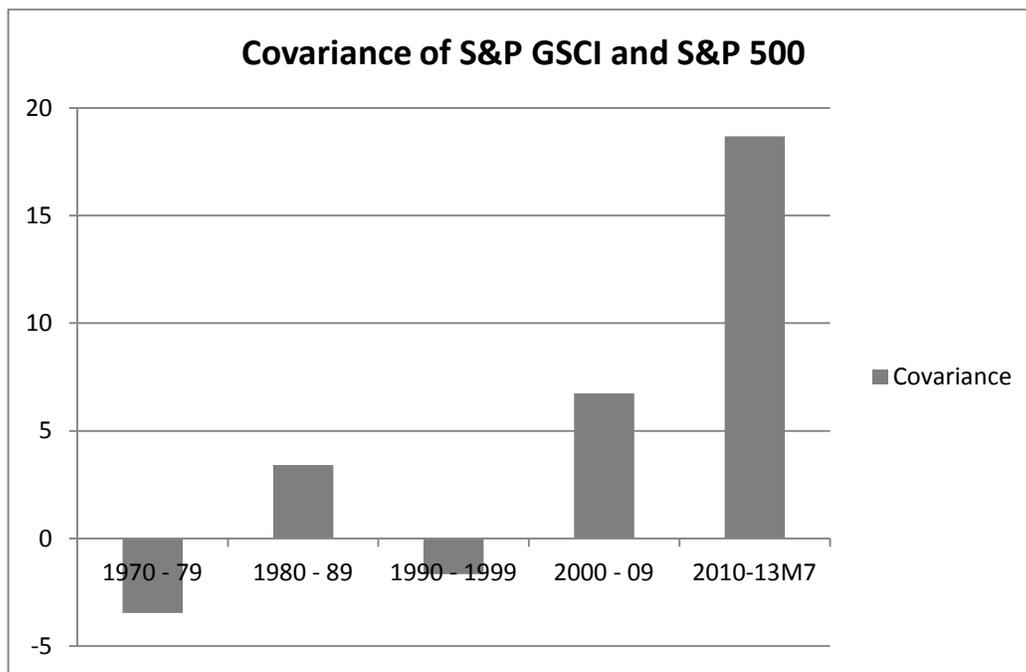


Figure 1: Covariance of S&P GSCI and S&P 500 by periods

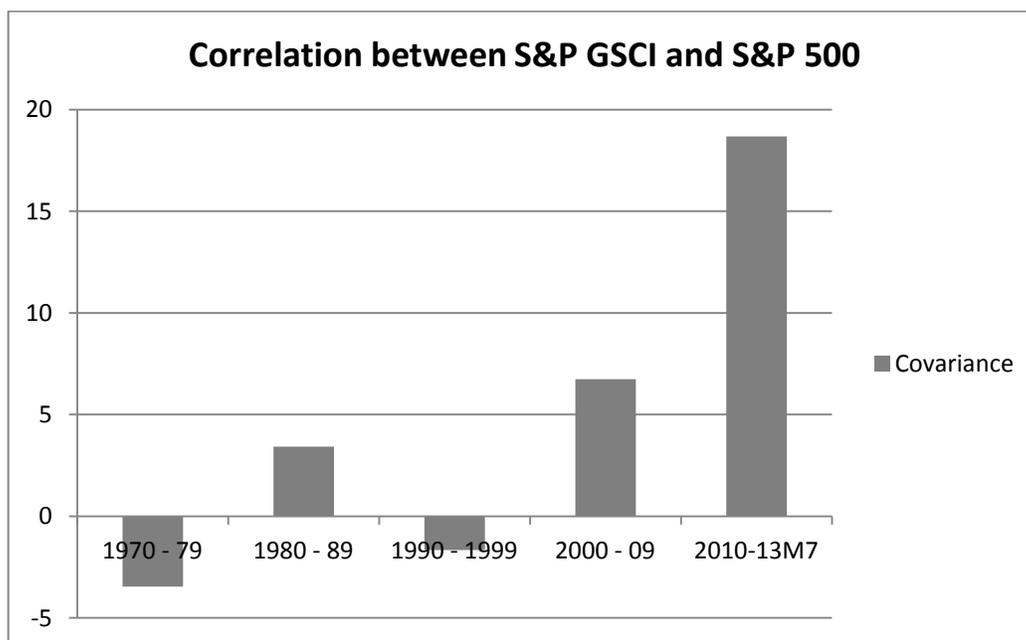


Figure 2: Correlation between S&P GSCI and S&P 500 by periods

Table 2: OLS Regression Results: $COMM_t = \alpha + \beta SP_t + \epsilon_t$

Period	β	Std. Err.	t	Sig.	R ²	DW
1970:M1 – 1979:M12 (n = 120)	-0.162	0.121	-1.34	0.184	0.014	1.84
1980:M1 – 1989:M12 (n = 120)	0.153	0.075	2.01	0.046*	0.033	1.80
1990:M1 – 1999:M12 (n = 120)	-0.110	0.120	-0.92	0.358	0.007	1.67
2000:M1 – 2009:M12 (n = 120)	0.310	0.141	2.20	0.030*	0.039	1.62
2010:M1 – 2013:M7 (n = 43)	1.070	0.128	8.35	0.000**	0.629	2.05
ALL: 1970M1 – 2013M7 (n = 523)	0.127	0.055	2.27	0.023*	0.009	1.67

** Significant at 1% level; * Significant at 5% level; DW = Durbin-Watson d-statistics

CONCLUSION

This paper is set up to dissect the covariance patterns of the returns on the commodity and equity markets. The results show that returns on the commodity and equity markets co-vary weakly in the opposite direction in the 1970s, move together in the same (weakly positive) direction in the 1980s, then journey in the slightly opposite direction again in the 1980s and run together in the weakly positive direction again in the 2000s. In the last 3.5 years (from 2010 to 2013M7), there is a significantly positive surge in the covariance between the returns on the

commodity and equity markets. The OLS estimates show that return on the stock market can significantly explain the return variability of the commodity market in the 2010s comparing to other periods.

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A COMPARATIVE STUDY OF NABH ACCREDITATION PROCESS IN INDIA WITH SPECIAL REFERENCE TO TERTIARY CARE HOSPITALS OF INDORE (INDIA)

Authors: Dr. A.K Jain, Assistant Professor, Institute of Management Studies, DAVV Indore (M.P) India
Email: ajju34jain@yahoo.co.uk
Ms Nikita Purandare, Student, Institute of Management Studies, DAVV Indore (M.P) India
E-mail: nikitapurandare26@yahoo.com

ABSTRACT

Accreditation is a process of ensuring measurable quality in any organization. Four pioneer national healthcare accreditation standards are - Joint Commission (USA), The Australian Council on Healthcare Standards (ACHS), QHA Trent Accreditation (UK), and NABH- National Accreditation Board for hospital and healthcare providers (India). The healthcare accreditation process (Joint Commission) started in sixth decade of twentieth century in USA. NABH Accreditation of healthcare organizations that started six decades later than Joint Commission is a recent phenomenon in Indian subcontinent (since 2006 AD). NABH Accreditation process has been slow in India. Indore is a tier-3 city of central India with approximately 500 small, medium and big sized hospitals. Indore is first city in Madhya Pradesh where NABH accreditation process has started in hospitals. This study ventures into the comparative perspective of NABH accreditation in India and analysis of phases of NABH accreditation process in all four tertiary care hospitals of Indore. It was concluded that these hospitals are in different stages of accreditation process. In one out of the four hospitals the process is near completion (92% process completed) and it is likely to get NABH accreditation within three months. NABH Accreditation will not provide competitive edge in existing market but will also initiate the process of domestic and international medical tourism in Indore (Madhya Pradesh).

INTRODUCTION

Hospital accreditation has been defined as “A self-assessment and external peer assessment process used by health care organizations to accurately assess their level of performance in relation to established standards and to implement ways to continuously improve”. More popular and prominent agencies have been JC (Joint Commission) in USA, JCI (Joint Commission International) USA based international agency in more than 60 countries, ACHS (Australian Council on Healthcare Standards) in Australia, QHA (QHA Trent Accreditation) in England. NABH (National Accreditation Board for hospital and healthcare providers) is a new entrant (since 2006) to the list in India. JCI creates a mark on the world map and increases business through medical tourism. In ACHS, the Evaluation and Quality Improvement Program (EQUIP) is the core accreditation program. QHA Trent Accreditation is a private British-based healthcare company, owned and managed by a group of clinicians and experts who work within the British public healthcare sector and in private medical practice. Quality Council of India (QCI) and its National Accreditation Board for Hospitals and Healthcare providers NABH have designed an exhaustive healthcare standard for hospitals and healthcare providers. As per standards the eligibility for NABH accreditation has been for hospitals above 100 beds capacity. NABH accreditation for hospitals has been made compulsory for registration under Central Government Health Scheme in India. Soon NABH accreditation may become a prerequisite for corporate tie-ups and managed care in India. Indore is a commercial city in Madhya Pradesh and a representative of tier-3 cities in India for study.

LITERATURE REVIEW

Quality has acquired a vital importance in all walks of life now a day. All top level managers in business organizations are giving special emphasis on quality (Fausto, 1999). For preparation for an upcoming accreditation the matter or content is gathered through e-mail from list serves, through the previous accreditation reports of one's hometown, literature published through various media and research papers (K. Friedrich; Fred Brose, 2006). NABH provides for documented process for its healthcare activities in hundreds of hospitals. It

refers that patient care not only involves the core clinical care, but also other support activities like requisition of tests, medicines, nurse doctor coordination, infection control practices, training, and so on (**Rajpal, 2008**). **Trehan & Jain (2009)** concluded accreditation as essential requirement for initiating the process of medical tourism in Indore, M.P. (India). **Hartmann, (2010)** challenged the hospital accreditation on the plea, that subjective parameters such as quality of life or patient satisfaction gain importance as outcome parameters and benchmarks in health care. In many countries hospitals are now undergoing accreditation as mandatory/or voluntary measures to improve quality and marketability.

METHODOLOGY

It is an exploratory study conducted in the organized industry of healthcare sector viz., tertiary care hospitals in Indore. The sampling unit are tertiary care hospital of Indore (MP), India & sample size has been all four hospitals (out of 17 eligible hospitals) undergoing NABH accreditation process in Indore. The primary data was collected through questionnaire consisting of 25 questions divided into four sections. Secondary data has been collected through websites like www.nabh.co, www.wikipedia.org, www.healthcare.financialexpress.com, www.yellowpages .webindia123.com, www.listbesthospitals.com, www.jointcommissioninternational.org, <http://cbhidghs.nic.in>, etc. till June, 2013. The statistical simple tools have been percentage and average calculated as follows. Bar Graphs, Pie charts and Line Diagrams have been prepared with the help of MS Office software. Calculation based on Percentage formula = $\frac{X}{\text{Total}} \times 100$ (X= variable). The categorization of all four hospitals for the convenience has been done as follows-CHL Hospital (for project study addressed as Hospital “A”), Greater Kailash Hospital (for project study addressed as Hospital “B”), Bombay Hospital (for project study addressed as Hospital “C”), and Choithram Hospital (for project study addressed as Hospital “D”)

DATA ANALYSIS AND INTERPRETATION

1. Comparison Of Percentage Of Hospitals Accredited By JCI, Internationally And In India

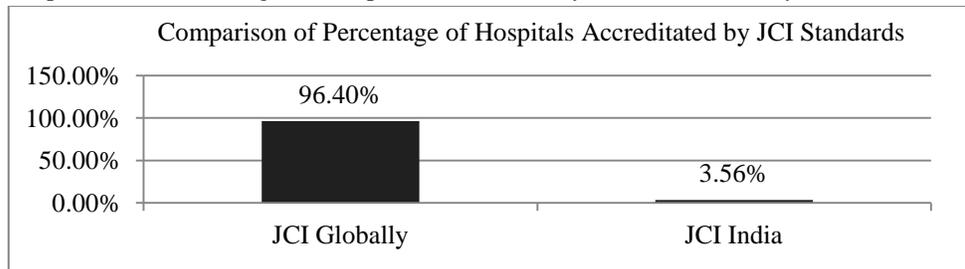


Chart: 2 Comparative analysis showing JCI at Global and National level

Interpretation- India stands at top fifth position with 3.56% of JCI accredited hospitals numerically worldwide.

2. Penetration Level Of JCI And NABH in India

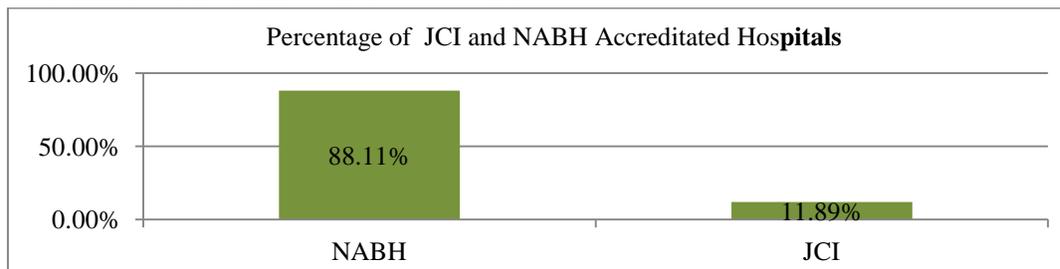


Chart: 4 Graph Showing penetration level of JCI and NABH accreditation in Hospitals of India

Interpretation-In India the penetration level of NABH is much more (88.1%) than the Joint commission International (11.89%).

3. Growth of NABH accredited hospitals in India

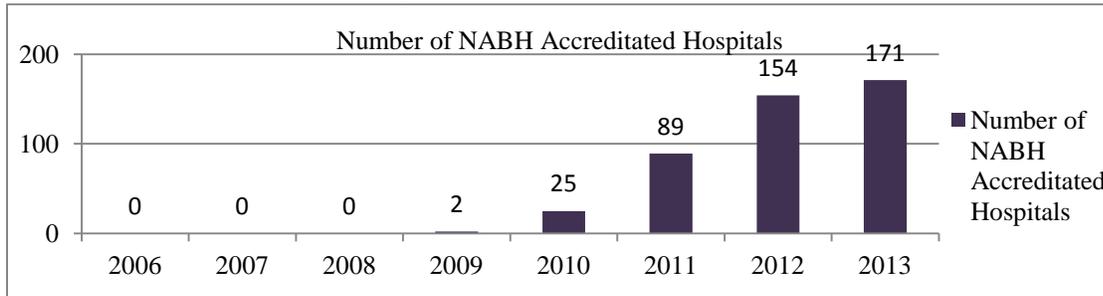


Chart 5: Growth of NABH accredited hospitals year wise since 2006 till date (Data till 1st April 2013)
 Interpretation- The growth Scale of NABH accreditation shows an elevated graph indicating that awareness regarding NABH in India is increasing each year.

4. Number of NABH-hospitals at National, State(Madhya Pradesh) and Local (Indore) Level

a) At National Level

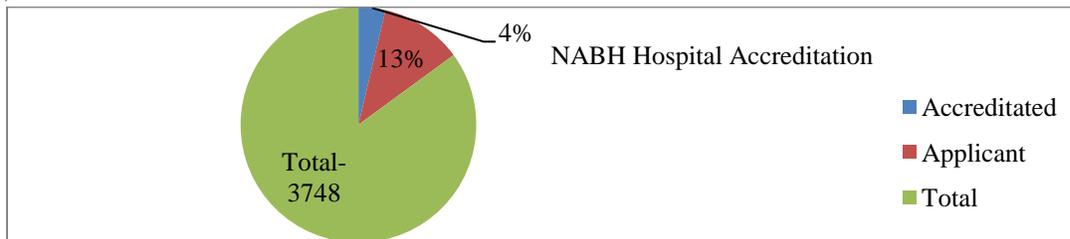


CHART 6.a: Percentage of NABH accredited and applicant Hospitals in India
 Interpretation- only 4% (163 hospitals) have been certified by NABH and 13% (496 hospitals) have applied for NABH accreditation among the total eligible hospitals(3748) in India.

b) At State Level (Madhya Pradesh)

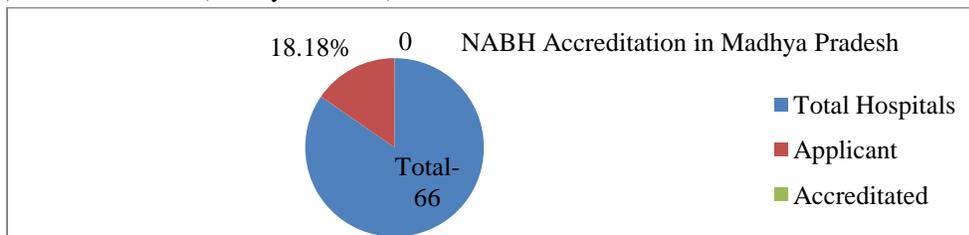


CHART 6.b: Percentage of NABH accredited and applicant Hospitals in Madhya Pradesh
 Interpretation-No hospital in M.P. is NABH certified though 18% (12) of total eligible hospitals (66) have applied for NABH.

c) At Local(Indore) Level

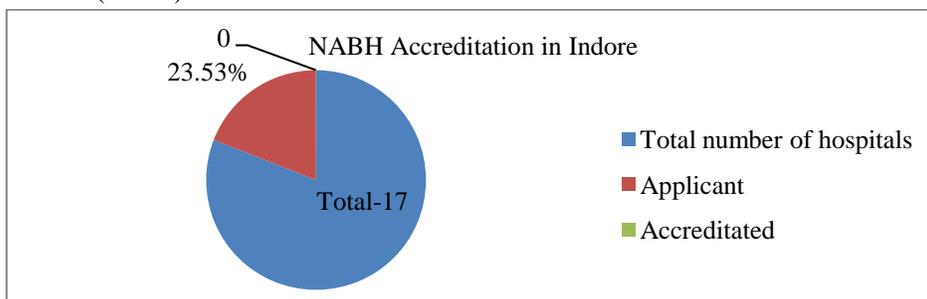


CHART 6.c: Percentage of NABH accredited and applicant Hospitals in Indore
 Interpretation-No hospital in Indore is NABH certified though 24% (4) of total eligible hospitals (17) have applied for NABH.

5. NABH Accredited hospitals across various cities of India

a) One Tier Cities

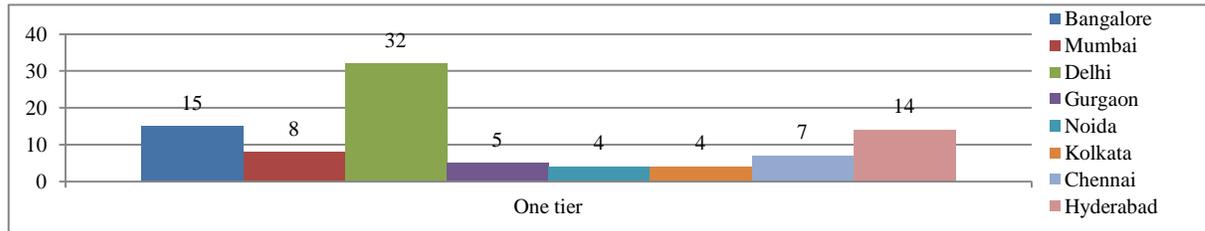


Chart 7.a: Graph indicating one tier cities with number of NABH accredited hospitals

b) Two Tier Cities

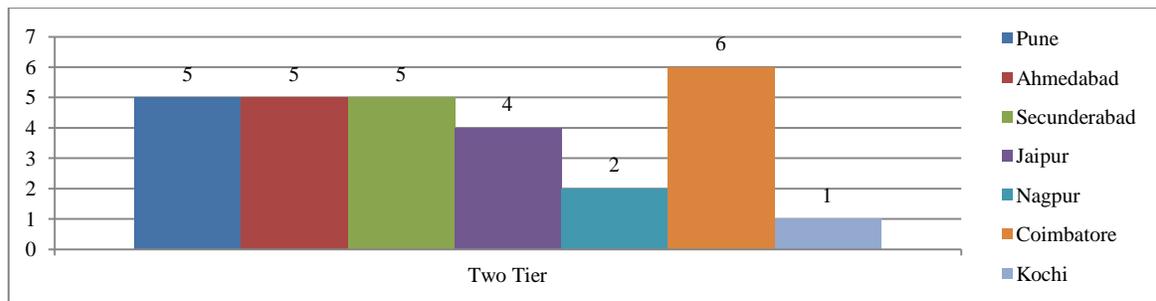


Chart 7.b: Graph indicating two tier cities with number of NABH accredited hospitals

c) Three Tier Cities

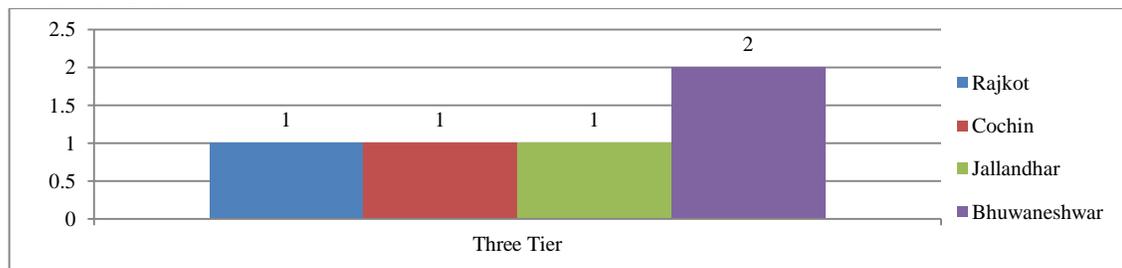


Chart 7.c: Graph indicating three tier cities with number of NABH accredited hospitals

6. Interpretation and Analysis of the four hospitals on the basis of the Questionnaire

The three scale questionnaire classifies the response into:

1. Yes- indicating the completion of the process component
2. No- indicating the incompleteness of the process component
3. In Process- indicating the positive efforts towards completion

a) Gap Analysis phase

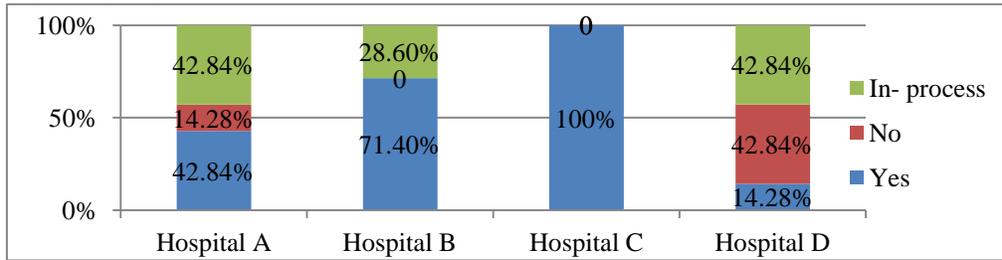


Chart 8.a: Bar graph showing Gap analysis phase completion (%) in four hospitals

b) Documentation Phase

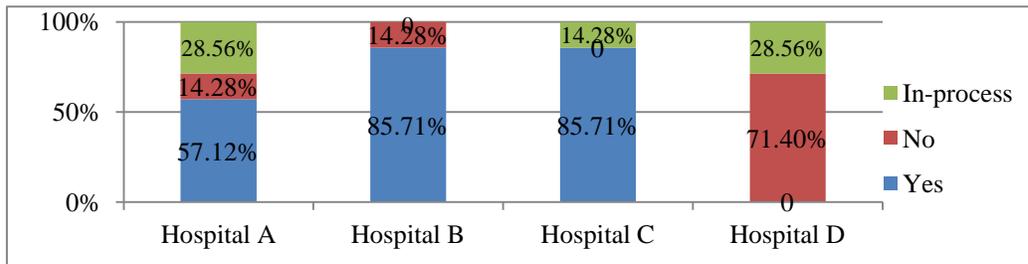


Chart 8.b: Bar graph showing Documentation phase completion (%) in four hospitals

c) Implementation Phase

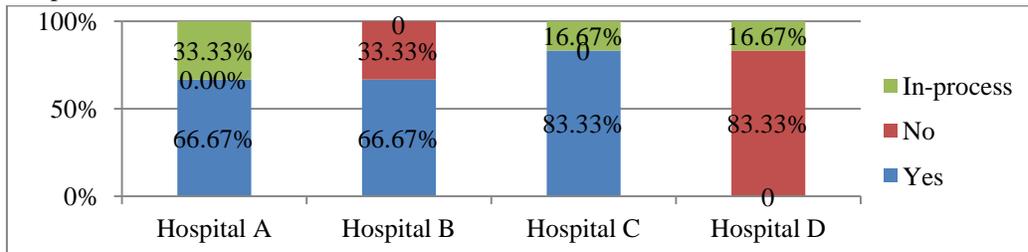


Chart 8.c: Bar graph showing Implementation phase completion (%) in four hospitals

d) Assessment Phase

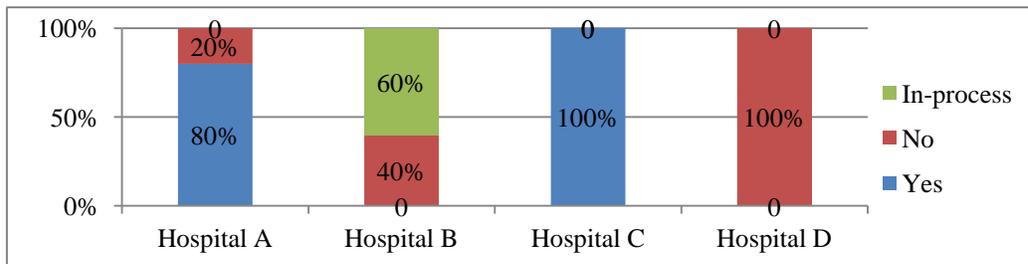


Chart 8.d: Bar graph showing Assessment phase completion (%) in four hospitals

7. Percentage of Overall Process completion in each Hospital

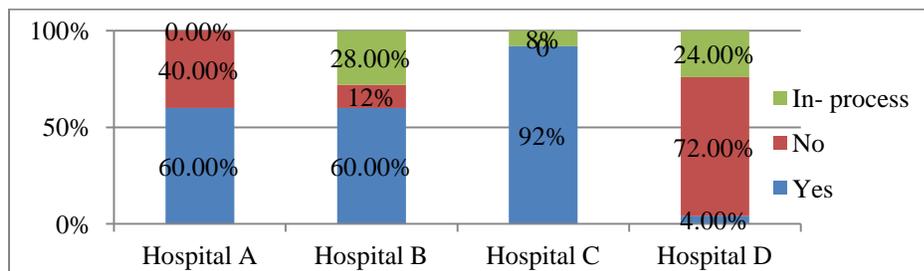


Chart 9: Graph showing percentage completion of overall process

Interpretation- Through these graph inference can be drawn that majority of the hospitals have completed more than 60 % of the process and the rest are in progress towards the achievement.

CONCLUSION

The numbers of JCI accredited hospitals in India are one eighth of NABH accredited hospitals (total 163). Until April, 2013, Out of all eligible hospitals in India only 13.23% have applied for NABH and 4.34% hospitals have received the NABH certificate. 8.89% hospitals are in process of getting NABH accreditation in India. All tier-1 cities have ABH hospitals with 3 top-notch cities Delhi, Bangalore and Mumbai. Among 2-tier cities only 7 cities have NABH Accredited hospitals with Coimbatore having the highest NABH hospitals. Among three tier cities only 4 cities have 5 NABH accredited hospitals. Indore is a tier three city with no NABH hospital. No hospital in Madhya Pradesh is NABH accredited though 12 hospitals have applied for it. In Indore 4 hospitals have applied for NABH process, out of which 2 are trust and 2 are private hospitals. Exploratory study regarding NABH Accreditation process in Indore concluded that, i) overall only 1 tertiary care hospital has completed 92% of this process ii) two hospitals have completed 60% of the process iii) and the fourth hospital has just initiated the process and will take another two years for significant progress. One among these 4 hospitals is going to get NABH accredited soon which shall be the first NABH-accredited hospital in Madhya Pradesh, India. Accreditation increases the marketability of the hospital. NABH accredited hospitals can provide a competitive edge and may be instrumental in starting the process of medical tourism in Madhya Pradesh.

RECOMMENDATION

In India, Government should make some legislative and policy effort to make some kind of Quality accreditation/certification mandatory for hospitals catering to a bigger mass of people especially public hospitals.

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A NON-LINEAR LAGRANGIAN DUAL FOR MULTI-OBJECTIVE INTEGER PROGRAMMING

Shifali Bhargava, Deptt. of Mathematics, B.S.A. College, Mathura (U.P.) India. (shifalibhargava@gmail.com)

ABSTRACT

In this paper, we present a new non-linear dual formulation of an exponential form for multi-objective bounded integer programming. This new formulation possesses an asymptotic strong duality property and guarantees a success in identifying a primal optimal solution. No actual dual search is needed in the solution process when the parameter of the nonlinear lagrangian formulation is set to be large enough.

Keywords: *Non-linear lagrangian dual, Logarithmic exponential dual formulation, Multi-objective bounded integer programming, Asymptotic strong duality property.*

INTRODUCTION

Lagrangian duality theory has played a fundamental role in the development of theory and methodologies for constrained optimization problems. The success of conventional lagrangian methods has been largely related to problems where a saddle point exists. Many optimization algorithms have been derived based on the lagrangian dual relationship. Lagrangian dual methods have also been suggested for some special classes of non-linear integer programming problems. (Michelon and Maculan, 1991;1993) While the optimal value of the lagrangian dual always bounds the optimal objective value of the primal problem from below, the lagrangian dual search often fails to identify the exact optimal solution of the primal problem.

A number of successful applications of the lagrangian relaxation technique has been documented. (Fisher, 1981) Also a number of possible duals are considered and it is shown that both inequality and congruence constraints are inherent in IP models and they give their own well defined duals. (Sun and Li, 2000). The feasibility of applying the branch and bound approach to non-linear convex integer programming problems has been investigated. (Gupta and Ravindran, 1985). Integer non-linear programming problems have also been studied by lagrangian decomposition. By solving the dual lagrangian relaxation, the solution of a non-linear programming problem with continuous variables and the solution of an integer linear programming problem have been studied. (Michelon and Maculan, 1991). A saddle point result for a general class of non-convex optimization problems with inequality constraints was obtained by using a transformation equivalent to taking the p^{th} power of the objective function and the constraints under several conditions and a p -norm surrogate constraint method is proposed for integer programming. (Li, 1995;1999). A logarithmic exponential value estimation function formulation is developed to acquire computational tractability and efficiency of global optimization problems and it has already been proposed for bounded integer programming problems which possess an asymptotic strong duality property and guarantees the identification of an optimal solution of the primal problem. To offer a success guarantee for the dual search in generating an optimal solution of the primal integer programming problem, the p^{th} power lagrangian method is developed. (Michelon and Maculan, 1993; Sun and Li, 1995, 2000). Duality for general multi-objective optimization problems has also been studied using the conjugacy approach. Necessary and sufficient conditions which completely characterize the strong and total lagrange duality respectively for convex optimization problems are given. (Bot and Wanka, 2004; Bot, Grad and Wanka, 2008). A nonlinear dual formulation of an exponential form has been proposed for bounded integer programming which possess an asymptotic strong duality property and guarantees a success in identifying a primal optimal solution. (Xu and Li, 2002)

MULTI-OBJECTIVE INTEGER PROGRAMMING PROBLEM

Here, in this paper, we consider the following bounded multi-objective integer programming problem:

$$\begin{aligned} & \text{Min.}\{f_1(x): g_j(x) \leq 0, j \in I, x \in X\} \\ & \text{Min.}\{f_2(x): g_j(x) \leq 0, j \in I, x \in X\} \\ & \cdot \\ & \cdot \\ & \cdot \\ & \text{Min.}\{f_n(x): g_j(x) \leq 0, j \in I, x \in X\} \end{aligned}$$

Where $I = \{1, 2, \dots, m\}$ $f_1(x), f_2(x), \dots, f_n(x): R^n \rightarrow R$ and $g_j(x): R^n \rightarrow R$ are continuous functions, X is a finite integer set. This problem is here called the primal problem.

The feasible region of this problem is given as follows:

$$S = \{x \in X : g_j(x) \leq 0, j \in I\}$$

Here we assume that $S \neq \emptyset$ and $f_i(x) > 0 \forall i$ and $x \in X$.

Here in this paper we propose a new nonlinear lagrangian dual formulation for multi-objective bounded integer programming. This dual formulation possess an asymptotic strong duality property and guarantees the identification of an optimal solution of the primal problem. Also no actual dual search is needed when parameters are set under certain threshold values. Earlier nonlinear lagrangian dual has been developed for single objective integer programming. (Xu and Li, 2002) Here we extend this work for multi-objective integer programming.

INVESTIGATION OF PERTURBATION FUNCTIONS

As the main feature in the non-linear lagrangian theory is to construct a non-linear support of the perturbation function at the optimal point, here in this section we investigate the perturbation functions associated with the primal problem. This highlights the main features of multi-objective bounded integer programming on applying the lagrangian relaxation method.

We define n perturbation functions as follows:

$$\begin{aligned} \psi_1(z_1, z_2, \dots, z_n) &= \text{Min.}\{f_1(x): g_j(x) \leq z_j, j \in I, x \in X\} \\ \psi_2(z_1, z_2, \dots, z_n) &= \text{Min.}\{f_2(x): g_j(x) \leq z_j, j \in I, x \in X\} \\ & \cdot \\ & \cdot \\ & \cdot \\ \psi_n(z_1, z_2, \dots, z_n) &= \text{Min.}\{f_n(x): g_j(x) \leq z_j, j \in I, x \in X\} \end{aligned}$$

These all perturbation functions $\psi_i(z_1, z_2, \dots, z_n)$ are defined on the domain

$$F = \{(z_1, z_2, \dots, z_n) \in R^n : \exists x \in X, g_j(x) \leq z_j, j \in I\}$$

These all perturbation functions are non-increasing piecewise constant functions of (z_1, z_2, \dots, z_n) and are continuous from right.

Let $z = (z_1, z_2, \dots, z_n, y_1, y_2, \dots, y_n)$ We define a set in R^{2n} .

$$E = \{z : y_i = \psi_i(z_1, z_2, \dots, z_n), (z_1, z_2, \dots, z_n) \in F\}$$

Thus E defines a function over F .

Lagrangian methods have been widely used in solving integer programming in finding optimal solution. (Fisher, 1981; Michelon and Maculan, 1991; Sun and Li, 1995, Xu and Li, 2002). Now to focus on the optimal solution, that may be hidden behind the convex hull of the perturbation functions, we need some classes of functions whose

non-linear concave contours can support E at the point P^* . Now we are defining functions below which fulfill such requirements:

$$C_1(z, \lambda_1) = y_1 + \frac{e^{\lambda_1 z_1}}{\lambda_1}$$

$$C_2(z, \lambda_2) = y_2 + \frac{e^{\lambda_2 z_2}}{\lambda_2}$$

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$$C_n(z, \lambda_n) = y_n + \frac{e^{\lambda_n z_n}}{\lambda_n}$$

Let $y_i + \frac{e^{\lambda_i z_i}}{\lambda_i} = \alpha_i$. Then $\frac{dy_i}{dz_i} = e^{-\lambda_i z_i}$

Then we conclude that the domain of z_i in the contour $C_i(z, \lambda_i) = \alpha_i$ for any $\lambda_i > 0$ is $\left(-\infty, \ln\left(\frac{\lambda_i \alpha_i}{\lambda_i}\right)\right)$.

Also

$$\frac{dy_i}{dz_i} < 0, \lambda_i > 0, z_i \in \left(-\infty, \ln(\lambda_i \alpha_i / \lambda_i)\right)$$

$$\frac{dy_i}{dz_i} \rightarrow 0, \lambda_i \rightarrow 0, z_i \in \left(-\infty, 0\right)$$

$$\frac{dy_i}{dz_i} \rightarrow -\infty, \lambda_i \rightarrow \infty, z_i \in \left(0, \ln(\lambda_i \alpha_i / \lambda_i)\right)$$

Thus y_i 's are strictly decreasing functions of z_i in its domain, when $\lambda_i > 0$. Also if λ_i is chosen large enough, then the values of y_i on the contour $C_i(z, \lambda_i) = \alpha_i$ would decrease very slowly, when z_i are negative, while it would decrease rapidly, if z_i are positive. Thus if the values of λ_i are sufficiently large enough, the curves of the contours $C_i(z, \lambda_i)$ are an approximation of shifted cones obtained by shifting the negative orthant. These features of $C_i(z, \lambda_i)$ offer a non-linear support to E and ensure a unique support at the point P^* which may not have linear support in terms of z_1, z_2, \dots, z_n and y_1, y_2, \dots, y_n .

EXPONENTIAL FORMULATION OF NON-LINEAR LAGRANGIAN DUAL FOR MULTI-OBJECTIVE INTEGER PROGRAMMING

Now we propose a new non-linear lagrangian method for multi-objective integer programming and prove its asymptotic strong duality property.

Let us define the non-linear lagrangian function associated with the original primal problem. For a given $p > 0$

$$L_{pi}(x, \lambda_i) = f_i(x) + \frac{1}{\|\lambda_i\|} \exp \sum_{j=1}^m \lambda_{ij} g_j(x), \lambda_i \in R_p^m$$

Where $R_p^m = \{\lambda_i \in R_+^m : \|\lambda_i\| \geq p_i\}$

The lagrangian dual problem corresponding to the original problem is defined as:

$$D_{pi} = \max_{\lambda_i \in R_p^m} Q_{pi}(\lambda_i)$$

Now we give the following lemma.

LEMMA 1.

For a given $p > 0$, if $\lambda_i \in R_p^m$, then the following hold:

a) $f_i(x) < L_{pi}(x, \lambda_i)$, for any $x \in X$

b) $f_i(x) < L_{pi}(x, \lambda_i) \leq f_i(x) + 1/p_i$

Proof:

As $L_{pi}(x, \lambda_i) = f_i(x) + \frac{1}{\|\lambda_i\|} \exp \sum_{j=1}^m \lambda_{ij} g_j(x)$, $\lambda_i \in R_p^m$

$\Rightarrow L_{pi}(x, \lambda_i) > f_i(x)$ as $p_i > 0 \Rightarrow \|\lambda_i\| > 0$

Also as $0 < \exp \sum_{j=1}^m \lambda_{ij} g_j(x) \leq 1$ for any $x \in X$ and $\lambda_i \in R_p^m$

$\Rightarrow f_i(x) < L_{pi}(x, \lambda_i) \leq f_i(x) + 1/p_i$

THEOREM 1. (ASYMPTOTIC STRONG DUALITY)

$$\lim_{p_i \rightarrow \infty} D_{pi} = f_i^*, \quad \forall i$$

PROOF: Let $S = X$. Then by part b) of above lemma

$$f_i(x) < L_{pi}(x, \lambda_i) \leq f_i(x) + 1/p_i$$

$$\begin{aligned} \Rightarrow \lim_{p_i \rightarrow \infty} D_{pi} &= \lim_{p_i \rightarrow \infty} \max_{\lambda_i \in R_p^m} Q_{pi}(\lambda_i) \\ &= \lim_{p_i \rightarrow \infty} \min_{x \in X} L_{pi}(x, \lambda_i) \\ &= \min_{x \in S} f_i(x) \end{aligned}$$

Again let $X \setminus S \neq \emptyset$. Then we have,

$$\begin{aligned} D_{pi} &= \lim_{p_i \rightarrow \infty} \min_{x \in X} L_{pi}(x, \lambda_i) \\ &= \max_{\lambda_i \in R_p^m} \min_{x \in X} L_{pi}(x, \lambda_i) \\ &= f_i^* + 1/p_i \quad \{ \text{By part b) of above lemma} \} \end{aligned}$$

where $f_i^* = \min_{x \in S} f_i(x)$

Since $X \setminus S$ is finite, \exists for any $X \setminus S$, let $\eta = \min_{x \in X \setminus S} \max \{g_1(x), g_2(x), \dots, g_m(x)\} > 0$.

Then for any $p > 1$, \exists some $\lambda_i \in R_p^m$, such that

$$\min_{x \in X \setminus S} L_{pi}(x, \lambda_i) \geq \min_{x \in S} L_{pi}(x, \lambda_i)$$

Now suppose that \exists no $\lambda_i \in R_p^m$ such that above equation holds. Then for any $\lambda_i \in R_p^m$, we have

$$D_{pi} \geq Q_{pi}(\lambda_i) = \min \left\{ \min_{x \in X \setminus S} L_{pi}(x, \lambda_i), \min_{x \in S} L_{pi}(x, \lambda_i) \right\}$$

$$= \min_{x \in X \setminus S} L_{p_i}(x, \lambda_i)$$

$$> \min_{x \in X \setminus S} \frac{1}{\|\lambda_i\|} \exp \sum_{j=1}^m \lambda_{ij} g_j(x)$$

Set $\lambda_{ij} = p_i$ for one j corresponding to $g_j(x)$ and from above equation for others we have,

$$D_{p_i} > \frac{1}{p_i} \exp(p_i \eta) > \frac{1}{2} p_i \eta^2, \quad \forall i$$

If p_i is large enough, this equation leads to a contradiction. Hence there should exist λ_i^* such that

$$\min_{x \in X \setminus S} L_{p_i}(x, \lambda_i) \geq \min_{x \in S} L_{p_i}(x, \lambda_i).$$

Thus by part b) of above lemma, we have

$$D_{p_i} \geq Q_{p_i}(\lambda_i^*)$$

$$= \min \left\{ \min_{x \in X \setminus S} L_{p_i}(x, \lambda_i^*), \min_{x \in S} L_{p_i}(x, \lambda_i^*) \right\}$$

$$= \min_{x \in S} L_{p_i}(x, \lambda_i^*)$$

$$> f_i^*$$

But as $f_i^* = \min_{x \in S} f_i(x)$, we can say that for any $p_i > 0$

$$f_i^* < D_{p_i} \leq f_i^* + 1/p_i, \text{ Therefore}$$

$$\lim_{p_i \rightarrow \infty} D_{p_i} = f_i^*, \quad \forall i$$

Thus the proposed logarithmic-exponential dual formulation possesses an asymptotic strong duality property. Thus the optimal value of the lagrangian dual problem attains the optimal value of the primal problem when p approaches infinity. Now we are interested in the condition for finite p_i with which an optimal solution of the primal problem can be identified by proposed non-linear lagrangian formulation.

LEMMA 2.

If $p_i > 1/\delta_i$, then any optimal solution x^* of problem $Q_{p_i}(\lambda_i) = \min_{x \in X} L_{p_i}(x, \lambda_i)$ satisfying $x^* \in S$ is an optimal solution of the original problem.

PROOF:By part b) of the given Lemma 1. We have,

$$f_i(x^*) < L_{p_i}(x^*, \lambda_i) = \min_{x \in X} L_{p_i}(x, \lambda_i) \leq f_i(x) + 1/p_i$$

If $p_i > 1/\delta_i$, then $f_i(x^*) - f_i^* < \delta_i$.

This implies that $x^* \in S$ is an optimal solution of the original problem.

CONVEXITY AND UNIMODALITY

Now we discuss the convexity of the above discussed nonlinear lagrangian dual with respect to the lagrangian multipliers. Also the unimodality of the dual function is discussed when the parameters p_i are large enough.

LEMMA 3.

a) For any $x \in X$ and $p_i > 0$, $L_{p_i}(x, \lambda_i)$ are convex functions of λ_i .

b) For any $p_i > 0$ and $\lambda_i > p_i$, $Q_{p_i}(\lambda_i)$ are continuous piecewise functions of λ_i

c) If f_i and g_i are both convex functions, then for any $p_i > 0$, and $\lambda_i > p_i$, $L_{p_i}(x, \lambda_i)$ are convex functions of x .

PROOF: As $L_{p_i}(x, \lambda_i) = f_i(x) + \frac{1}{\|\lambda_i\|} \exp \sum_{j=1}^m \lambda_{ij} g_j(x)$, $\lambda_i \in R_p^m$

Where $R_p^m = \{\lambda_i \in R_+^m : \|\lambda_i\| \geq p_i\}$ with one constraint we can write,

$$\frac{\partial L_{p_i}(x, \lambda_i)}{\partial \lambda_i} = \frac{(\lambda_i g_j(x) - 1) \exp(\lambda_i g_j(x))}{\lambda_i^2}$$

$$\text{and } \frac{\partial^2}{\partial \lambda_i^2} L_{p_i}(x, \lambda_i) = \frac{[(\lambda_i g_j(x) - 1)^2 + 1] \exp(\lambda_i g_j(x))}{\lambda_i^3}$$

As $\frac{\partial^2}{\partial \lambda_i^2} L_{p_i}(x, \lambda_i) > 0$, for any $\lambda_i > 0$. a) follows.

As X is finite and part a) is proved, part b) follows directly.

As $\exp(h(x))$ is convex if $h(x)$ is convex part c) follows directly.

Now the defined perturbation functions $\psi_i(z_1, z_2, \dots, z_n)$ are non-increasing piecewise constant functions of (z_1, z_2, \dots, z_n) and are continuous from right. As X is finite, the number of discontinuities of functions $\psi_i(z_1, z_2, \dots, z_n)$ are finite. Hence without any loss of generality, we list the discontinuities of $\psi_i(z_1, z_2, \dots, z_n)$ as $\{a_{i1}, a_{i2}, \dots, a_{i(k+l)}\}$ which satisfy the condition

$$a_{i1} < a_{i2} < \dots < a_{ik} \leq 0 < a_{i(k+1)} < \dots < a_{i(k+l)}$$

Here we have assumed that $k \geq 1$. Let $a_{ij} = (z_{1j}, z_{2j}, \dots, z_{nj})$. Let $\psi_i(a_{ij}) = b_{ij}$ for $j = 1, 2, \dots, k+l$

These all perturbation functions are non-increasing and their discontinuous points are strictly decreasing. By the definition of these perturbation functions and the assumption that $f_i(x) > 0$, $\forall i$ and $x \in X$, we can say that

$$b_{i1} > b_{i2} > \dots > b_{ik} > b_{i(k+1)} > \dots > b_{i(k+l)} > 0$$

$$\text{Let } S(E) = \{(a_{ij}, b_{ij}) \in R^{2n} : j = 1, 2, \dots, k+l\}$$

Now the point $(z_1, z_2, \dots, z_n, y_1, y_2, \dots, y_n) \in S(E)$ iff $(z_1, z_2, \dots, z_n, y_1, y_2, \dots, y_n) \in E$, the lower envelope set defined by

$$E = \{z : y_i = \psi_i(z_1, z_2, \dots, z_n), (z_1, z_2, \dots, z_n) \in F\}$$

Now it is clear that (a_{ij}, b_{ij}) is associated with a feasible solution of the original primal problem, when $1 \leq j \leq k+l$ and with an infeasible solution of primal problem when $k+1 \leq j \leq k+l$

LEMMA 4.

a) For any $p > 0$ and $p_i > 0$, if x^* is an optimal solution of

$$Q_{p_i}(\lambda_i) = \min_{x \in X} L_{p_i}(x, \lambda_i)$$

Then $(g_j(x^*), f_j(x^*)) \in S(E)$

b) There exist at least one optimal solution $x^* \in S^*$ such that

$$(g_j(x^*), f_j(x^*)) \in S(E)$$

PROOF: Let $(g_j(x^*), f_j(x^*)) \in E$, but $(g_j(x^*), f_j(x^*)) \in S(E)$ does not hold true. Then by the definition of perturbation functions, E and $S(E)$, there exist an \bar{x} such that $f_i(\bar{x}) \leq f_i(x^*)$ and $g_j(\bar{x}) < g_j(x^*)$, $\forall i, j$. Hence for any $p > 0$, we have $L_{pi}(\bar{x}, \lambda_i) < L_{pi}(x^*, \lambda_i)$ which is a contradiction to the optimality of x^* defined by $Q_{pi}(\lambda_i) = \min_{x \in X} L_{pi}(x, \lambda_i)$.

Now as it is clear that $(g_j(x), f_j(x)) \in E$, for any $x \in S^*$. For any $z_j < g_j(x^*)$, we have $S^* \cap \{x : g_j(x) \leq z_j, x \in X\} = \emptyset$. Hence $\psi_i(z_1, z_2, \dots, z_n) > f_i(x^*)$.

$\Rightarrow (z_1, z_2, \dots, z_n, f_1(x^*), f_2(x^*), \dots, f_n(x^*))$ does not lie in E . Hence $(g_j(x^*), f_j(x^*)) \in S(E)$

Let
$$h_{pi}^j = b_{ij} + \frac{\exp(\lambda_i a_{ij})}{\lambda_i}, \quad j = 1, 2, \dots, k+l$$

Then by Lemma 4, we have $Q_{pi}(\lambda_i) = \min_{x \in X} L_{pi}(x, \lambda_i) = \min_{1 \leq j \leq k+l} h_{pi}^j(\lambda_i)$

Thus the function defined as $Q_{pi}(\lambda_i) = \min_{x \in X} L_{pi}(x, \lambda_i)$ is a unimodal function when p is sufficiently large.

THEOREM 2.

When $p \geq \frac{1}{k+1}$, $\exists \lambda_i^* \geq p$ such that $Q_{pi}(\lambda_i)$ are monotonically increasing functions in $[p, \lambda_i^*]$, and monotonically decreasing in $[\lambda_i^*, \infty)$.

PROOF: Let $Q_{pi}^1(\lambda_i) = \min_{1 \leq j \leq k} h_{pi}^j(\lambda_i)$

and $Q_{pi}^2(\lambda_i) = \min_{k+1 \leq j \leq k+l} h_{pi}^j(\lambda_i)$

For any $1 \leq j \leq k+1$, we have

$$\frac{d}{dx} h_{pi}^j(\lambda_i) = \frac{(\lambda_i a_{ij} - 1)}{\lambda_i^2} \exp(\lambda_i a_{ij})$$

Which gives the result that for any $k+1 \leq j \leq k+l$, $h_{pi}^j(\lambda_i)$ are monotonically decreasing in $(0, 1/a_{ij})$ and monotonically increasing in $(1/a_{ij}, \infty)$. Thus $Q_{pi}^2(\lambda_i)$ are monotonically increasing in

$\bigcap_{k+1 \leq j \leq k+l} (1/a_{ij}, \infty) = (1/a_{i(k+1)}, \infty)$ and $Q_{pi}^2(\lambda_i) \rightarrow \infty$ as $\lambda_i \rightarrow \infty$. On the other hand, $Q_{pi}^1(\lambda_i)$ are

monotonically decreasing in $(1/a_{i(k+1)}, \infty)$ and $\lim_{\lambda_i \rightarrow \infty} Q_{pi}^1(\lambda_i) < +\infty$. Since $Q_{pi}(\lambda_i) = \min\{Q_{pi}^1(\lambda_i), Q_{pi}^2(\lambda_i)\}$

there surely exist a λ_i in interval $[p, \infty)$ which proves the theorem. Thus we can easily give the result that

when $p \geq \frac{1}{k+1}$, the lagrangian dual problem has finite solution λ_i^* .

THEOREM 3.

If $p \geq \max\{\lambda_i^*, 2(b_1 - b_k)\}$, then any optimal solution of the problem $Q_{pi}(\lambda_i) = \min_{x \in X} L_{pi}(x, \lambda_i)$ is a primal optimal solution of given problem.

PROOF: As $a_{i1} < a_{i2} < \dots < a_{ik} \leq 0 < a_{i(k+1)} < \dots < a_{i(k+l)}$ and $b_{i1} > b_{i2} > \dots > b_{ik} > b_{i(k+1)} > \dots > b_{i(k+l)} > 0$, we can say that the optimal solution of problem $Q_{pi}(\lambda_i) = \min_{x \in X} L_{pi}(x, \lambda_i)$ will be the optimal solution of given problem if it satisfies $(g_j(x^*), f_j(x^*)) = (a_{jk}, b_{jk})$. Now (a_{jk}, b_{jk}) will be a solution of $Q_{pi}(\lambda_i)$ if $b_{jk} + \frac{\exp(\lambda_i a_{jk})}{\lambda_i} \leq b_{ij} + \frac{\exp(\lambda_i a_{ij})}{\lambda_i}$, $\forall 1 \leq j \leq k$

Hence with the help of $p \geq \max\{\lambda_i^*, 2(b_1 - b_k)\}$, we can have the above inequality.

Hence the theorem is proved.

CONCLUSION

- New non-linear dual formulation in an exponential form has been presented for multi-objective bounded integer programming.
- This formulation has asymptotic strong duality property.
- This formulation guarantees the identification of the optimal solution of the primal problem.

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IMPACT OF INTELLECTUAL PROPERTY RIGHTS ON BUSINESS PERFORMANCE IN MICRO SMALL AND MEDIUM SECTOR IN INDIA: WITH REFERENCE TO PHARMA SECTOR

Dr. J. Krishnaiah, APSFC, Hyderabad, India krishnaiahj@rediffmail.com

Prof. P. Narayana Reddy, Ph.D, Director Dr.YSR National Institute of tourism and Hospitality Management, Telecom Nagar, Hyderabad,India-500 032, profpnr@yahoo.co.in

ABSTRACT

Micro Small and Medium Enterprise (MSME's) have been recognized as one of the crucial sectors in contributing to the most of the nations in the world in terms of Industrial production, exports, employment generation and growth of entrepreneurship. The liberalization of India economy has opened up new opportunities and more challenges to MSME's sector in India. One of the problems that the sector is facing is intensive competition not only from within the country but also international players. One of the ways to face the challenge is to improve the technology base. The existing literature proves that developing, improving or adopting new technologies will strengthen the competitive position of the MSME Sector. Here comes the role of Intellectual property rights. Again within this MSME sector, there are number of sub-sectors where the role of intellectual rights play dominant role. One such sector is Indian pharmaceutical industry currently tops the India's science and technology based industries. This paper evaluates how far the Indian micro small and medium pharmaceutical enterprises are adopting new technologies to improve their performance. It also assesses the range of technologies required and used in their respective pharmaceutical industries.

This paper is based on the study conducted with the help of Managing directors/ chief executive officers/managers of 161 Micro, small and medium pharmaceutical enterprises. The study was conducted by administering a questionnaire on a five point scale. The collected data was analyzed with the help of statistical tools like T-test, ANOVA. The study reveals that MSMEs recognized the importance of adopting process and product patents to improve their competitive strength. Significant number of enterprises are adopted latest technologies. However, majority of the pharmaceutical enterprises still in the process of recognizing and adopting the better technologies. The study concludes that there is a positive impact of Intellectual property rights on the MSMEs in terms of their business growth and overall development.

Index terms: Pharmaceutical Enterprises, Intellectual Property Rights. MOT, SME,

INTRODUCTION: Worldwide SMEs have been accepted as the engine of economic growth for promoting equitable development. SMEs occupy a place of strategic importance in the Indian economy. Technology and its management are today matters of global primacy. The manufacturing scenario has undergone a rapid change in the last decade, more so in the last few years. In the modern age, technology is perhaps every nation's most important resource[CBCR 2012]. Pharma Industry in India and playing a significant role in improving the health standards of the people. Hyderabad has become the hub of bulk drug and pharmaceutical companies owing to low cost manufacturing, large population, high demand and highly skilled work force. The Industry consists of Large, Medium and many small –scale units provide tremendous employment opportunities. The large number of SME entrepreneurs is technocrats who have work experience with large or medium pharma firms and organizations who have established small and Medium Pharmaceutical enterprises in and around Hyderabad.

REVIEW OF LITERATURE: The pharmaceutical industry is one of fastest emerging international center for contract research and manufacturing services. More than 90% of the world wide pharma production and 97% of the R & D activities occur in developed countries and also more than 80% of the patents granted in developing countries belong to the residents of industrial nations(Abinav Agarwal 2006).Technology places a key role in

providing cutting edge for development with acquisition and technology adaptation to suit the local conditions (Yuko nikaido,2004). Effective and efficient technology management practices are especially important for Small and Medium-sized enterprises (SMEs) during all life-stages of an enterprise due to the critical role of technology in entrepreneurial activities(Vijay Jain,2012).The main variables affecting innovation are consisting of firm strategy, expenditure on research and development, use of technological information sources and overall performance of the firm(ramaiah,2009). The technology adaption and firm performance in Small and Medium Enterprises is mainly depend upon the Educational back ground and previous Industrial experience of the Managing Director/General Manager of the firms(Carrj2005).The higher education sector and its growing expertise place a key role in learning technology implementation to develop effective in small and medium enterprises(Hector campos 2009).

A study of the competitive advantage in successful new technology based firms found that their technology strategy played a key role for making these companies improve their competitive advantage (Yuko Nikaido 2004).Technology places a key role in providing cutting edge for development with acquisition and technology adaptation to suit the local conditions(Maheswarri 2008). Small scale industries have failed to cope with the emerging challenges to keep pace with the latest developments especially in terms of IPR. (aditya Kutty 2011). The acquisition of new technology is absolutely vital for all enterprises that want to procure or retain a competitive edge in the market. The Technology Transfer agreements are necessary to fulfill technological needs that are impossible to meet with local technical capabilities (tarek khalil 2009) Small scale industries have failed to cope with the emerging challenges to keep pace with the latest developments especially in terms of IPR(Bhatnagar 2008, Aguirra2009). In the present age of increasing degree of globalization, it has become equally imperative for SMEs to be technologically innovative and show improved performance. The success of SMEs is widely depended on innovations, research and development and intellectual property. It is critical not only to remain competitive but also to gain significant advantages by developing and commercializing new technologies(vijay Jain 2013).

OBJECTIVES: The main objective is to study the impact of Intellectual property rights in Micro Small and Medium Enterprises of selected Pharmaceutical enterprises in the state of Andhra Pradesh in India and identify key factors which influence the business performance. This broad objective is crystallized into the following specific objectives. To assess the use of IPRs based vs non-IPRs based manufacturing pharmaceuticals. How far the IPRs are influencing the business performance. Finally, to assess the strategies adopted in managing MSMEs technologies.

METHODOLOGY: The study area consists of three regions of Andhra Pradesh namely Ralyalasema, Telangana and Coastal. The study focus on the selected Pharmaceutical formulations. A purposive sample of 161 processing enterprises among four categories in three different regions in Andhra Pradesh, were selected for the study. Primary data was collected through a structured questionnaire administered with the enterprise owners/chief executive officers/managers in selected SMEs. The questionnaires were distributed to 161 respondents of SMEs. The assessment of variables i.e. Technology strategies identified from the study of Vijay Jain and Ravi Kiran (2012) [9]. The Secondary data was collected from annual reports of the companies, books, journals and articles related to SMEs, MOT and IPR.

Table1: Demographic Characteristics of the Sample

Item		N	%
Gender	Male	129	80.12
	Female	32	19.88
		161	
	over 50 years	63	39.13
		161	
Highest Level of Education	Normal education	41	25.46
	Diploma	15	9.31

	Degree	28	17.39
	Masters	32	19.87
	Professional	45	27.95
		161	
Prior business experience	5 to 6 years	9	5.59
	7 to 8 years	27	16.77
	9 to 10 years	35	21.73
	11 to 12 years	32	19.87
	Above 12 years	58	36.02
		161	
Age of the enterprise	5 to 6 years	18	11.18
	7to 9years	22	13.66
	10to 11 years	33	20.49
	12to 14 years	38	23.60
	Above 14 years	50	31.05
		161	
Entrepreneur belong to generation	1 st generation	45	27.95
	2nd generation	89	55.27
	3 rd generation	27	16.77
		161	
Location of enterprise	Special Economic zone	10	6.21
	Non-Special Economic zone	20	12.42
	Industrial development area	90	55.90
	Non-Industrial development area	30	18.63
	Cluster group in specified location	11	6.83
		161	

The demographic profile of the respondents of SMEs is shown in table 1. One hundred and sixty one (161) usable responses were used for the analysis. 80.12% were male owners and 19.88% were female owners, Age group are above 50 years are 37.13 %, in the type of business majority of the enterprises 39.13% are partnership firms, Normal education 25.46 % is the level of education , prior business experience of above 12 years are of 36.02%, age of the enterprise above 14 years of 31.05% and finally majority of entrepreneurs belong to 2nd generation with 55.27% .

RESULTS AND ANALYSIS: Of the total 161 59 are using patented technologies to manufacture the required products. Over 51 are using just technology up gradation, 34 are using with the help of transfer of technology and the remaining 17 are through just improvement through their own efforts. This clearly indicates that there an

improvement in this sector to follow IPR orientation in their efforts to face competition and to better their business performance.

Table: 2 Industry wise distribution

S. No.	Technology Strategies	Mean	Rank	No of Industries	Percentage
1	Intellectual Property Rights	4.46	1	59	36.65
2	Technology Up gradation	3.96	2	51	31.68
3	Transfer of technology	3.89	3	34	21.12
4	Investment in R & D	3.60	4	17	10.55
	Total			161	100

Table 3: Technology Strategies adopted by SMEs- ANOVA results

Technology Management Strategies	Cronbach's Alpha if Item Detected	Between &s (BG) / Within (WG)	Sum of Squares	df	Mean Square	F	Sig.
Intellectual Property Rights	0.831	BG	0.521	3	0.172	0.789	0.002
		WG	34.342	158	0.25		
		Total	34.863	161			
Adoption of new technology	0.852	BG	1.672	3	0.471	1.67	0.038
		WG	33.934	158	0.252		
		Total	35.606	161			
Technology Transfer	0.823	BG	17.238	3	5.34	30.44	0.045
		WG	21.619	158	0.165		
		Total	38.857	161			
Investment in R & D	0.862	BG	19.368	3	6.743	36.54	0.021
		WG	17.147	158	0.119		
		Total	36.515	161			

From the above table, the reliability of the data shows adequate for consistency to appropriately interpret analysis. ANOVA was used to analyze the impact of technology management strategies in chemical processing enterprises of three selected regions. The ANOVA results highlights that all the strategies are significant since $p < 0.05$

Table 4: Performance of Business: IPRs Vs. / Non-IPRs units

✓ S No.	✓ Performance Status	✓ IP Industries (78)	✓ %	✓ NO N - IPR Industries (83)	✓ %	✓ No of Industries
✓ 1	✓ Improved	✓ 45	✓ 57.6	✓ 23	✓ 27.7	✓ 68
✓ 2	✓ Status co	✓ 13	✓ 16.6	✓ 35	✓ 42.1	✓ 48
✓ 3	✓ Declined	✓ 20	✓ 25.6	✓ 25	✓ 30.1	✓ 45
✓	✓ Total	✓ 78	✓ 100	✓ 83	✓ 100	✓ 161

The above table clearly indicates that over 57 per cent of the small and medium scale enterprises following IPRs are able to improve their business performance and nearly 26 per cent of the units down the performance. However, nearly 28 percent of the enterprises are showing better performance in spite of not following IPRs. On the other side over 42 percent of the units maintain their status co and 30 percent of the units showing negative performance among the non-IPRs. The above analysis clearly indicates that IPRs units are better placed than non-IPR units. However, this is only an indication but not clear direction.

CONCLUSION: Small and medium scale enterprises in India particularly pharmaceutical enterprises are naturally follow trade mark, registered patents, acquire the technology from distant sources and finally invest funds in their own R&D. similarly many of the units in this category follow IPRs or expired IPRs technologies in their existing manufacturing system. In the study there is an indication that units following IPRs are showing better performance compared to non IPR units. However further study many prove more clearly that whether this performance is the clear direction in future.

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OPTIMIZATION OF PALLET LOADING IN TRANSPORTATION

ADSAVAKULCHAI SUWANNEE
SCHOOL OF ENGINEERING, UNIVERSITY OF THE THAI CHAMBER OF COMMERCE
126/1 VIBHAVADEE RANGSIT RD., BANGKOK, THAILAND
E-MAIL: SUWANNEE_ADS@UTCC.AC.TH

ABSTRACT

A pallet is used for the transport of goods in order to ship products from the manufactures to the retailers. However, in pallet industry, the pallets may represent a sizable investment by a company in operating assets that have enough real, intrinsic, regulatory or strategic value to warrant tracking. Thus, the main objective of this paper is to do the optimization of pallet loading in pallet production industry for transportation efficiently. There are two methodologies, to do the pallet loading, evaluating product packaging design, and product distribution using CAPE PACK program as a tool and to manage the pallets backhaul by loading the previous pallets and the other goods returned. The results demonstrated that the new loading pallets design using CAPEPACK could reduce transportation cost 21.0% per year. To do the backhaul can increase income 29.8% per year. In addition to the on-going research, to propose the renewable energy such as natural gas for vehicles (NGV) is one of the methodologies to reduced transportation cost.

Keywords: *optimization of pallet loading, CAPE PACK, backhaul, transportation*

INTRODUCTION

Pallets are widely used throughout industry, primarily for shipping of products. Many companies dispose of used pallets without regard to their condition. Pallets used to be disposable items that were good for a few transports and when they broke they would be thrown out. Two major changes in the industry have changed the way pallets are managed. The first change was a continual rise in the price of lumber. In 1998 wood pallets represented 90% of all the pallets manufactured. With the rise in the price of wood pallets became more expensive to replace when they broke. The other factor that affected pallet management was the rising costs of rubbish removal. Pallets were now both expensive to buy and expensive to throw away when they brake (The Wiley Encyclopedia Of Packaging Technology, 1995; Walter S., F, 2002).

The convergence of advancements in technology, market demands and the globalization of logistics has led to the emergence of a new supply chain execution applications area; Pallet management systems (Obert A. et al, 2011; Selke, s., et al, 2004). All the potential Pallet patterns determine and select whichever one provides the greatest stability to ensure less risk of the Pallet load falling over when being moved. As Pallet management systems suppliers expand and integrate with other supply chain solutions to fill out their functional capabilities should see true global asset identification, management and optimization capabilities. Combined with existing industry initiatives such as pooling Pallet management systems will become a more globally accepted and critical technology (Twede, D. et al, 2005).

CAPE PACK is a complicated group of programs which combines a user friendly style with graphics technology, making it as a tool for Pallet loading, evaluating product packaging design, and product distribution (). CAPE PACK can create several of solutions for loading cases onto pallets by entering data that relates to the case size, the Pallet size and any loading restrictions which might apply. The program also handles package arrangement and case design, primary package optimization, mixed product displays and promotional Pallet loads. Designers and engineers can simply select the program groups they need to design and redesign their packaging, test outer case materials and sizes and create mixed product pallets for retail display purposes. Thus, the main objective of this paper is to do the optimization of pallet loading in the pallet production industry.

RESEARCH METHODOLOGY

There are 4 steps to do the optimization of pallet management for efficiently transportation as following:

1. To define the existing problem using analyzing the parameters that lead to the organization transportation cost using cause and effect diagram (David S. et al, 2011; Wooldridge, J. 2009).
2. After the first step, to do the priority of each parameters using Pareto Chart (David P., 2007; Johnson, G. E., 1990; Nicholas L., 2010).
3. To analyze and develop the optimization of Pallet loading using CAPE PACK as a tool for pallet loading, evaluating product packaging design, and product distribution.
4. To improve the transportation efficiently by using backhaul analysis for the transportation management.

PROPOSED WORK

CAUSE AND EFFECT DIAGRAM

There are 5 steps to analysis as following:

- Step 1. To define the problem and put at the head of the fish in this paper is the high transportation cost.
- Step 2. The categories of the causes of the problem and these problems become the bones in the fish.
- Step 3. The specific causes of the problem
- Step 4: Descriptive of the causes
- Step 5: Identify areas that need data or investigation

After data collection for 1-2 months, there are four main parameters that lead to the high transportation cost are management, method, material and man as shown in Figure 1.

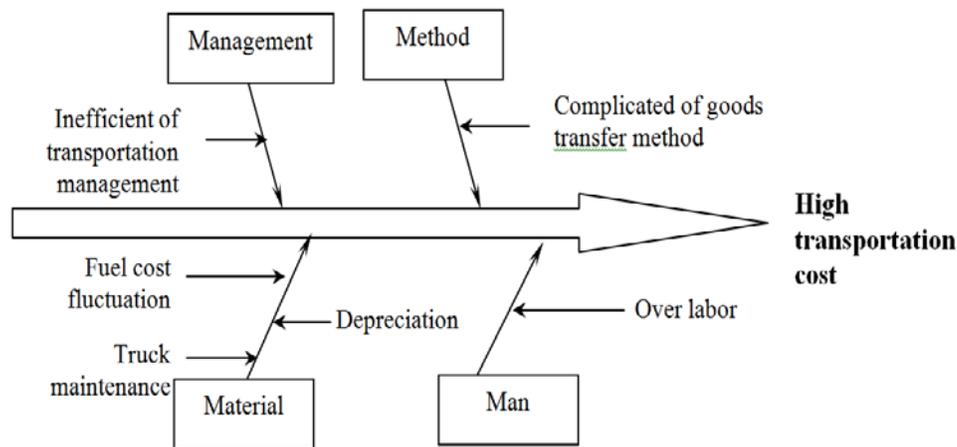


Figure 1: Cause and Effect Diagram

Management: Due to this company is the one of the small and medium enterprises (SMEs) that is inefficient of transportation management. This is because there is a limitation of vehicles that there are only six heavy trucks and one light truck. Moreover, the transportation distances among customers are very far comparing with the competitor.

Method: According to the pallet is made from wood that is more weight and requires the space during transportation. Material handling from place to place using the pallet leads to the complicated of goods transfer method i.e. goods handling using Folk Lift and Hand Lift.

Material: The main factors that affect the transportation cost are depreciation cost and maintenance cost that cannot avoidable. Moreover, fuel price is fluctuation that impact on the factory that located far from the customers.

Man: Labor is the other factor in transportation that carries out all goods from place to place.

PARETO CHART (David. P, 2007; Johnson, G. E. ,1990).

From Cause and Effect Diagram in Figure 1, the factors that are the impact on transportation cost are fuel cost, labor cost, depreciation cost and maintenance cost as shown in Table 1 and Figure 2.

Table 1: Cost analysis in November, 2012

Cost	Cost/month (baht)	% Cost brake down	% Accumulation
Fuel	86,400	72	72
Labor	18,900	16	88
Depreciation cost	11,667	9	98
Maintenance cost	3,000	2	100

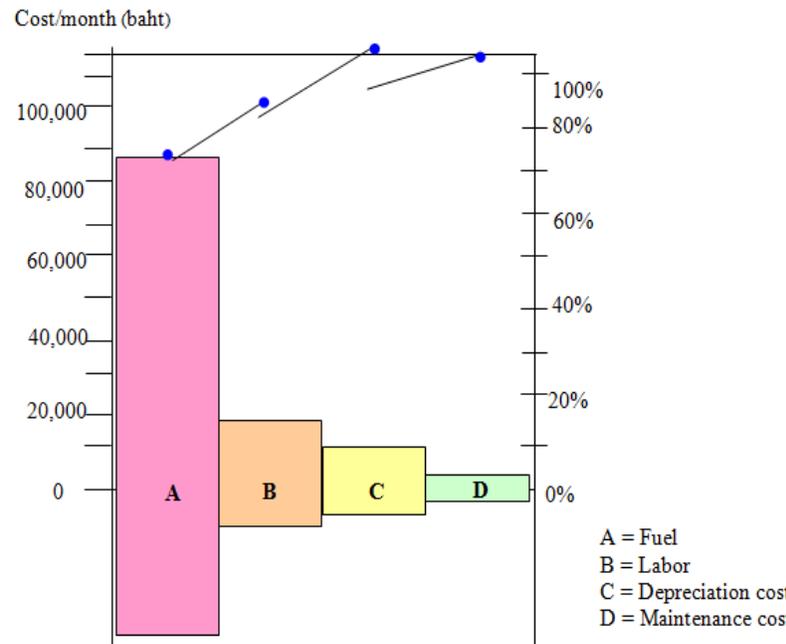


Figure 2: Pareto Chart

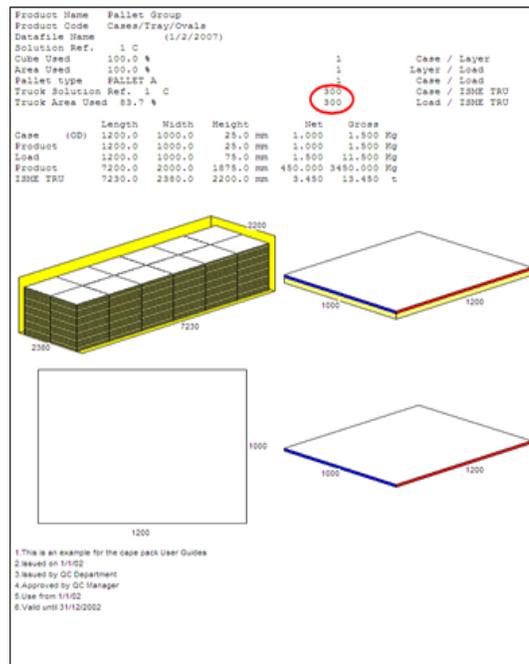
From Pareto Chart, the results are demonstrated as following:

1. The major effects of higher transportation costs are inefficiently transportation management, complicated of goods transfer method, labor intensive and fuel cost fluctuation and truck maintenance cost.
2. From Pareto chart, the transportation costs depends on fuel cost 72%.

TO DO OPTIMIZE THE PALLET MANAGEMENT

To run the program under hardware requirements for CAPE PACK is as following:

- Windows clients : Microsoft Windows 7 32-bit and 64-bit
- Windows server : Windows server 2008 32-bit and R2
- Moreover, CAPE PACK works in a CITRIX environment, either directed on a CITRIX server or within a CITRIX farm from an application server
- To manage how to load the goods in the full capacity
- To select the size of the truck to load and input in to the CAPE PACK
- Define the loading restrictions such as cube used, area used, pallet type, truck area used or loading sequences.
- Enter the existing dimensions (length, width, and weight) and quantities of pallet loads then CAPE PACK calculate a load plan as graphics display the pallet shown in Figure



From Figure 3, the result from the program demonstrated that the existing load management for 300 pallets. To rearrange the loading pallets for the least space capacity that might be full capacity of track at once time (Olsmat, C. and Dominic, C., 2003). To do the simulation using CAPE PACK for arrange the pallets as shown the proposed in Figure 4.

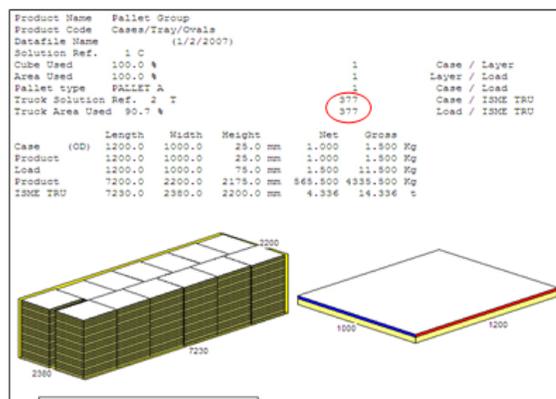


Figure 4: Proposed the Pallet management using CAPE PACK

From Figure 4, the result from the program demonstrated that the maximum loading for 377 pallets. The operator can manage space by manually to add more pallets that the program cannot do. After comparison between the old and new one, it found that the track could contain the pallets more from 300 pallets to 380 pallets (377 from CAPE PACK + 3 using manual added in available space that computer cannot do). It can be concluded that the incorporating results in significant saving transportation cost 21.0% (11,700.00 baht) as shown in Table 2.

Table 2 Comparisons between the current and proposed pallet management

Pallet management	# Item/trip	#Trip/mt.	T. Cost/trip (baht)	T. Cost/item	% d	T. Cost d (baht)
Current	300	16	3,900.00	13.00	-	-
Proposed	380	13	3,900.00	10.26	21.0	11,700.00

Where mt : month
 T. : transportation
 d : decrease

TO DO TRANSPORTATION MANAGEMENT USING BACKHAUL ANALYSIS.

Backhauling can be an effective strategy to substantially reduce the operating costs (Dominic, C., 2006; Johansson, K, et al, 1997; Paolo T. et al, 2002). Prior to implementing a backhaul program, several factors need to be considered such as the following: revenue, surcharges, loading times, equipment and driver utilization, claims and customer returns. Each backhaul opportunity needs to be fully analyzed and the impact on the company evaluated to ensure that the revenues realized outweigh the cost or risk to service. All the factors are considered; assuring that the backhaul program has a positive effect on the company and does not negatively impact customer service. To do the backhaul can increase income 29.8% per year.

CONCLUSION

CAPE PACK is an easy to use load-planning program which helps to create the best truck and the best pallets management that to decrease the transportation cost 21%. Therefore, one straightforward extension of our study would be the impact on the transportation cost is the fuel price. This is because the fuel price is 72% of total transportation cost. Then the transportation management using backhaul can increase the income 29.8% per year. In the future, to decrease more transportation cost by using renewable energy as NGV or LPG. Moreover, using the plastic pallet is the alternative raw material that environmental friendly and more sustainability.

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e-Governance: A vehicle towards MDG

Case study of Land Record Project [Bhoomi] of Government of Karnataka, India (Best Practice)



Authors Name & Affiliation

1) Dr. Namrata Agrawal(Ms), Ph.D.
Professor & MDP Coordinator
NIFM, Ministry of Finance, Government of Indi
Faridabad-121001(Haryana)
India
e-mail: namrata_agrawal@hotmail.com

&

2) Dr. Kamal Nayan Agarwal, Professor
Howard University
Washington DC, USA
E-mail : kagarwal1@yahoo.com

ABSTRACT

At the Millennium Summit in September 2000, world leaders adopted a set of Millennium Development Goals with focus on eradication of extreme poverty and hunger. Land records are instruments of social justice, cohesion and are critical to rural economy. Karnataka, one of the states in India with around 2 lakh square kilometers area, has two-third of total population of 53 million living in rural areas. The benefits of integrating ICT for easy access to Land Record services was achieved by the premier E-Governance project of the Government, the Bhoomi, and today it stands as a model of accountability, transparency and efficiency and stability in the management of land information services for the poorest of poor.

Farmers require land Record- RTC (record of Rights, Tenancy, and Crops) document for bank loans to buy crop seed and other agricultural needs. The RTC contains 47 information fields, detailing with land identifier, size, tax, owners, rights and liabilities, tenants, crops, yield, irrigation sources, mortgage details, soil type, bank loans, etc. An efficient Land Records Management System was required to promote transparency and harmony among the poor farmers to reduce legal disputes, promote resolution, provide accurate crop and insurance data and to avail loan.

The paper analyses the data as received from the Public Affairs Centre, Bangalore to establish the advantages of Bhoomi to poor peasants of India. Today a network of Bhoomi record access points has been set up in 177 taluk locations, serving farmers of 30,662 villages in the State. Given that about 500,000 people use the Bhoomi system per month, the benefit in terms of man days saved is approximately 110,000 man days per month, and 1.32 million man days per annum. The benefit of wages from the man days saved, at the most basic level, is at least Rs. 50 per day (almost \$1 per day), which translates into Rs. 66 million per annum.

The bigger saving for citizens is on bribes they pay in the manual system. The weighted average value of bribe paid in the manual system was Rs. 152.46 per person, while that in Bhoomi was Rs. 3.09. This means that the shift to Bhoomi offers users a potential saving of Rs. 149.37. Even if we reduce the saving by the fee that they have to pay, (Rs. 15), the net saving is Rs. 134.37. This translates to a saving of over Rs. 806 million in a year.

Bhoomi has achieved another elusive goal- it is one of very few self-sustaining e-governance services. The Ministry for Information Technology and Communications of India has announced that Bhoomi would be national model for Computerisation of Land Records and will be replicated all over the country.

Keywords: RTC : Record of Rights, Tenancy and Crops; Taluk: Sub-Districts

1. INTRODUCTION

Karnataka, one of the states in India with around 2 lakh square kilometers area, has two-third of total population of 53 million living in rural areas. The benefits of integrating ICT for easy access to Land Record services was achieved by the premier E-Governance project of the Government, the Bhoomi, and today it stands as a model of accountability, transparency, efficiency and stability in the management of land information services for the poorest of poor

Bhoomi was embraced enthusiastically by 70 lakh farmers and over 35 million dependent people. Land records that had costed high for its opaqueness and took weeks or longer had lost productivity but now the same may be made available in two minutes for a fee of just Rs15, far less than the former cost. In many taluks there are touch screen computer kiosks, where farmers can see their land record data. Such is the faith in the system and so friendly is the system that the request for mutation to the land records have increased three fold resulting in more updated land records. As per preliminary reports legal disputes have also gone down appreciably.

The BHOOMI has computerized 20 million records of land ownership of 6.7 million farmers in the state.

In Karnataka, Bhoomi project was conceptualized and started in 1991-92. Computerization of land records of 177 taluks were completed by March 2002. Bhoomi was initiated with a task of computerising over 20 million manually-managed land records, in respect of 6.7 million farmers with an average 0.6 hectare holding. A network of Bhoomi record access points was set up in 177 taluk locations, serving farmers of 30,662 villages in the State. Bhoomi project has been implemented in phases across all 203 taluk offices through Bhoomi centres in Karnataka. Today, BHOOMI has computerized 20 million records of land ownership of 6.7 million farmers in the state.

Previously, farmers had to seek out the Village Accountant to get a copy of the Record of Rights, Tenancy and Cultivation (RTC). There were delays and harassment. Bribes had to be paid. The Village Accountant could afford to ignore or delay action on these "mutation" (Request for change of ownership of land) requests and delay the requests for certificates. Land records in the custody of the Village Accountant were not open to public scrutiny. Over time, several inaccuracies crept into the old system through improper manipulation by the Village Accountant, particularly with respect to government land. In practice, it could take 1-2 years for the records to be updated. Delays resulted as hurdles to farmers trying to secure loans from banks.

Today, the situation has changed. In August 2002, for a fee of Rs.15, a printed copy of the RTC could be obtained online at computerized land record kiosks (Bhoomi centers) in 168 taluk offices. The remaining 9 taluks were expected to have a Bhoomi center by September 2002. Copies of land documents can be obtained for any land parcel in the taluk by providing the name of the owner or the plot (survey) number. A Village Accountant is available full-time at these kiosks. Farmers can get an RTC for any parcel of land in 5-30 minutes from an RTC information kiosk at the taluk headquarters since the land records are in the public domain. Any record can be viewed through a touch screen at 7 kiosks. There are plans to use the Bhoomi kiosk for disseminating other information, like list of destitutes and handicapped pensioners, families living below the poverty line, ration card holders getting food grain at concession prices, wholesale market prices and weather information.

2. SITUATION BEFORE THE BHOOMI PROJECT

The old manual system of management of land records was cumbersome and imposed burdens, hindered collection and analysis of data, and fell short of social and economic goals. Poor records lead to litigation and unrest. Updates were neither regular nor accurate. Delays and errors in data hampered the economy. The most serious issue is that of corruption and bribery. Two third of the users of the manual system paid a bribe, 66% of them have reported doing so very often.

2.1 Opaque and monopolistic

Farmers were required to seek the jurisdictional village accountant to obtain the RTC document. Some 9,000 village accountants each moved between three to four villages and were not easily available. There was no time limit for delivering the services, which ranged from 3 to 300 days. Their monopoly created bottlenecks, corruption, inefficiency, productivity loss and wastage of human resources. The records were not subject to public scrutiny. Requests to change of ownership of land (mutation) had to be filed with them, who had the power to oblige or ignore them. Farmers suffered from discretionary treatment, and there was huge scope for harassment and extortion.

2.2 Prone to manipulation

The decentralized maintenance had no systems and reporting mechanism. The inaccuracies and mismanagement lead to manipulation by Village Accountants. Changes were often recorded in pencil and could be altered at whim. The system of physical verification of records by tehsildars became weaker as the number of records multiplied and tehsildars were burdened with other regulatory obligations. Delays and document manipulation, often provoked problems for farmers trying to secure loans from banks, or delays to solve land tenure cases in litigation.

The time to provide RTCs used to take 3 to 30 days depending upon the importance of the record for the farmer and the size of the bribe.

3. INITIATIVE FOR IMPLEMENTATION OF THE PROJECT

The project was executed in phases; in first phase five taluks, in second phase 27 taluks @ 1 taluk per district and finally in third phase all remaining taluks. This strategy was adopted to ensure that we learn the lessons well before up scaling the project throughout the State. The project was conceptualized and started in 1991-92. In the first phase (end of March 2001), around 50 lakh RTC data of 50 taluks and its implementation took place, followed by the data in 15 million RTCs of remaining 127 taluks in digital form, one Kiosks in second

phase(end of March,2002), Interlinking of taluk level systems to district data centers and web enablement of this data, provision of connectivity to Banks and Courts (phase 3, April 2002 to March 2003), Interlinking of district level data banks to the state level data warehouse, and operationalisation of Bhoomi in all 203 taluks of Karnataka (phase 4, March 2003 onwards). At present, the project covers all over the state through Bhoomi Centers at taluk offices as well through Bhoomi Kiosks in various villages.

3.1 Funding

3.1.1 Central Government: Primarily funded by the Central Government through the Centrally Sponsored Scheme of Computerization of Land Records. The Ministry of Rural Development, Government of India has sponsored this project. The Ministry has provided funds for Bhoomi in various installments for various purposes namely for data entry, back end computerization, training, computer purchase and for up-gradation of infrastructure. As per information provided by Bhoomi Monitoring Cell, till March 1, 2006, the Central Government has provided Rs 27 crore for Bhoomi Project.

3.1.2 Government of Karnataka: Additional components in the scheme that were not funded by Government of India has been funded by Karnataka State Government. As per information provided by Bhoomi Monitoring Cell, till March 2006, the Government of Karnataka has provided Rs 6.44 crore for Bhoomi Project.

3.1.3 Others: Ministry of Communication and Information Technology, Government of India has provided a pool of Rs 5 crore to set up a state data center at Bangalore. However this data center is not exclusively for Bhoomi and can also be used by other agencies of the Government of Karnataka.

4. CHALLENGES

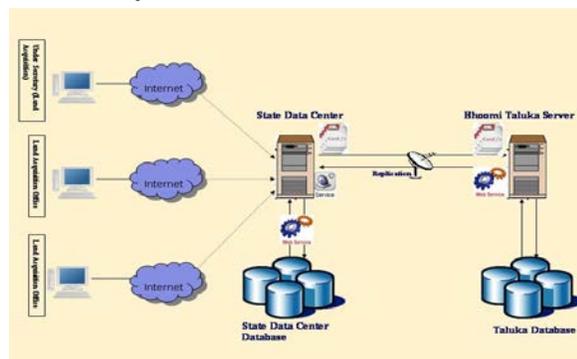
4.1 Political Will:

To implement the Bhoomi program, the government had at its disposal machinery, which included people who were ignorant of computers, people who had vested interests in the manual system and people who were resistant to change. Predictably, there were political and operational impediments, but given the clear goal of seeing the project to completion, each of them was effectively resolved. The Chief Minister of the state was in constant communication with the District Commissioners and also used to talk about Bhoomi in his political speeches. Manual records were declared invalid and the law was suitably amended to provide for the new system. Strong deterrents were put in place for errant officials and 44 of them were suspended from services in one district alone.

4.2 Harnessing Technology and Continuous Improvement of the System:

Land records have been computerized using latest technologies and platforms. Since land records were prone to tampering, and passwords in the new system could be hacked, state of art biometrics authentication process was implemented to provide foolproof security for the records. Under Bhoomi, changes in the land titles are done online instead of the earlier “batch” method. Continuous efforts has been put to make Bhoomi user-friendly and to make the system more transparent. Touch screen interfaces have been introduced. User convenience has been considered and Bhoomi centers have been set up at each taluk office.

Most importantly, the new technology seamlessly integrates with the old manual process with no change in the function of the field staff. The Bhoomi software incorporates the bio-logon metrics system from Compaq, which authenticates all users of the software using their fingerprint. A log is maintained of all transactions in a session. This makes an officer accountable for his decisions and actions. The government also has plans to web-enable the database to make available to the farmer a copy of the land record locally through an Internet kiosk -- although without signature such a copy will only have an informative value.



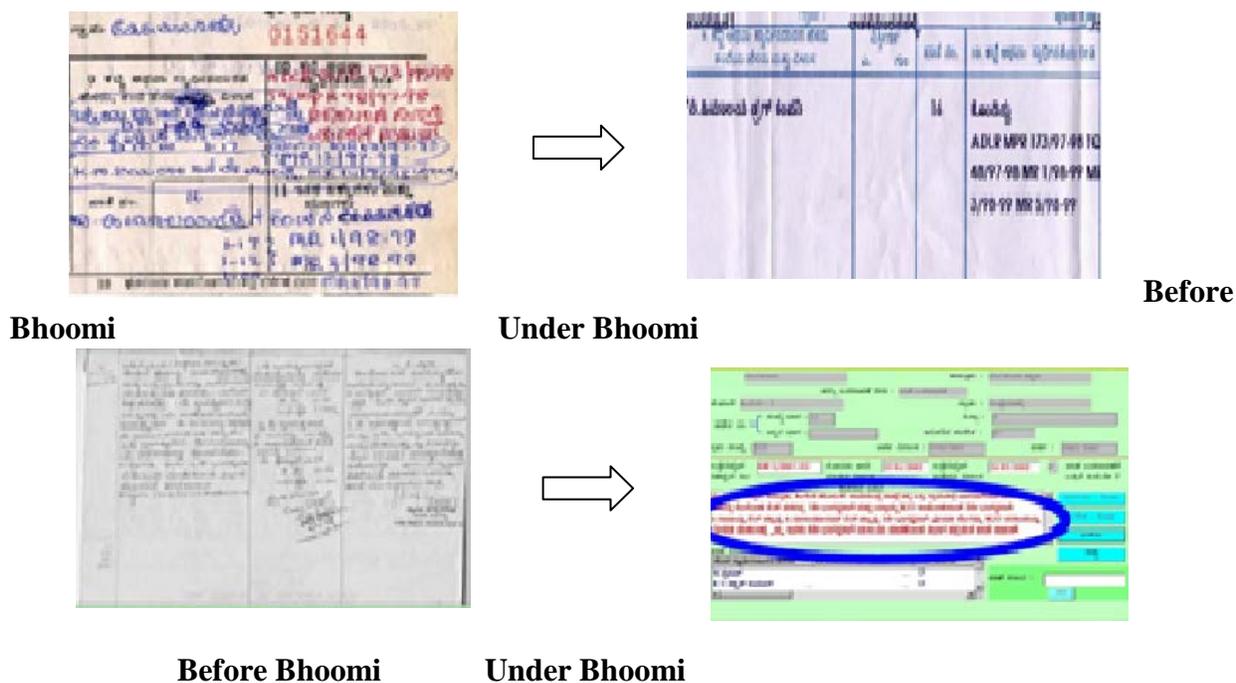


Figure- 23: The transition in documentation

4.3 Administrative Efforts and Committed Champions

Implementing Bhoomi project was a big task, which required clear vision and strong administrative efficiency from the state government. 16 workshops were conducted to determine the requirements of the software. 20,000 man months of data entry effort, spread over 27 cities, were put in. More than 50,000 man-hours of training were provided to the village accountants for managing the Bhoomi System. More than 200 detailed circulars clarified each and every aspect of Bhoomi. A strong ‘grievance redressal’ mechanism was set up. 20 million printouts were distributed to over 7 million farmers for validation of computerized land records. All these needed very strong administrative efficiency on the part of the state government as well as from the Karnataka Government. All the stakeholders, particularly Village Accountants, were very important to make the project successful, as they were the face of the government to the citizens.

5. GOVERNMENT AND URBAN POOR COMMUNITY INVOLVEMENT AND EXPERIENCE

Bhoomi has three delivery channels to provide services to the citizens. Services offered to the citizens through each of the three delivery channels are:

5.1 Bhoomi Computer Center /Kiosks

Bhoomi computer centers are located at each Taluk office of Karnataka where mutation and updation are done online. It includes fingerprint authentication and scanning of important documents to ensure robust and secure systems. Each Bhoomi center at taluk office also works as a Kiosk from where the farmers can collect the copy of their records (RTC, Khata extracts and Tax Information) by paying one fourth of a dollar (INR 15).

5.2 Bhoomi Village Kiosks

To avoid the need to travel to Taluk office, some land records kiosks have been set up in villages also where, by paying an additional INR 10/- (i.e. INR 15+ INR 10 = INR 25), the farmers can collect the copy of their records. These village kiosks have been set up through the public private partnership (PPP) model. Under this, the kiosk owner is a private party having computers and Internet connectivity. Villagers can visit the village kiosk any time

and, by paying INR 25/-, they can obtain the printout of the RTC. However, for mutation request, etc, the villagers have to travel to Bhoomi Computer Center at Taluk office. At present, the number of village kiosks is very less and government has started the process to set up more village kiosks through the PPP model.

5.3 Touch screen kiosks

At Touch Screen Kiosks, farmers can see their land related information without anybody’s intervention or help. At present, there are about 22 touch screen kiosks situated at taluk offices.

6.0. ASSESSMENT OF THE PROJECT

For the Bhoomi user sample OF six districts were selected to reflect geographic regions of Karnataka – Bijapur, Koppal, Hassan, Udipi, Chamrajnagar and Mandya. For the non-computerised facility user sample, the taluks where Bhoomi kiosks had not been set up were listed. Four taluks were selected through random sampling from the list – Udidpi taluk, Ankola taluk in Uttar Kannada, Gokak taluk in Belgaum and Channapatna taluk in Bangalore rural.

6.1 Educational background of respondents

Table 7: Educational background of respondents

Education: Chief wage Earner	Control (% respondents)	Bhoomi (% respondents)
Illiterate	8.5	21.
Informally literate	3.4	1.
Upto Primary	37.3	27.
Upto SSLC	25.4	28.
Upto PUC	11.9	9.
Graduate	11.9	9.
Diploma / ITI	1.7	1.
Post Graduate and above	-	1.

As per above table, the profile of respondents indicates the diversity of users of land records. A larger proportion of the Bhoomi sample respondents were from households where the Chief Wage Earners were illiterate. The educational status of respondents can be seen in the chart given below:

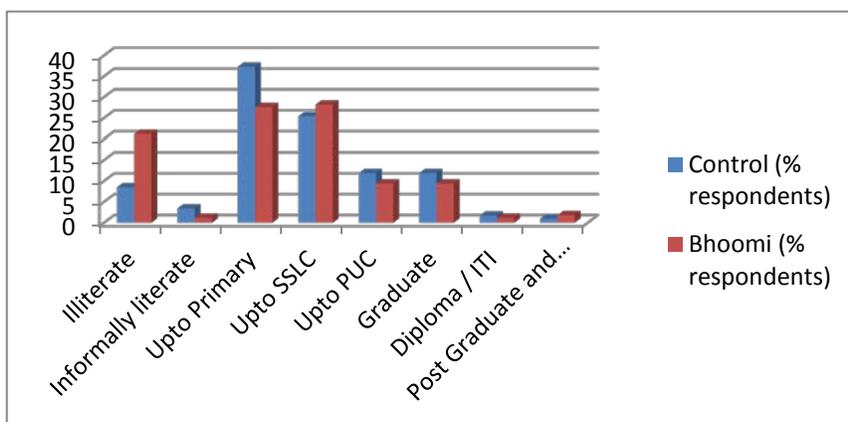


Chart1: Educational background of respondents

6.2 Type of information/document obtained by Bhoomi users

Table 9: Type of information/document obtained by Bhoomi users

Document needed - Obtained	Bhoomi (% respondents)
RTC (normal)	78.3
Modified RTC (involving mutation)	17.2
Copy of the mutation order	4.5
Others	-

As per above table, most of the Bhoomi users had visited the kiosks to obtain RTC(involving mutation). Only a very (2%) had sought to merely view the documents. The type of information/document obtained by Bhoomi users can be seen in the chart given below:

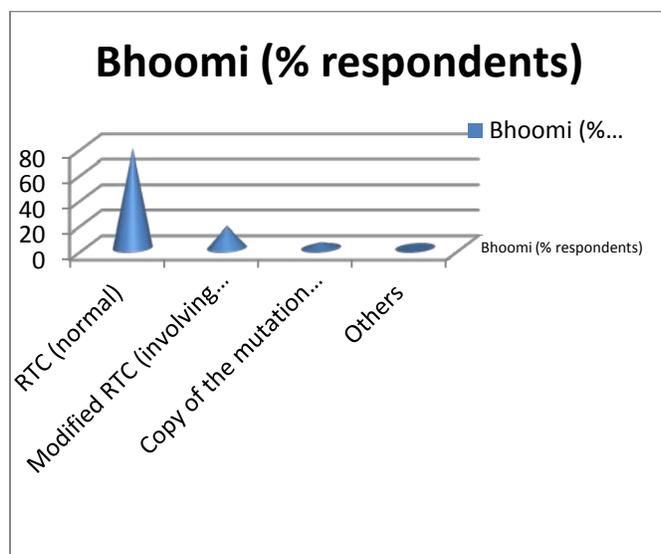


Chart3: Type of information/document obtained by Bhoomi users

6.3 Purpose for which RTC/document sought

Table 10: Purpose for which RTC/document sought

Purpose for which document was obtained	Normal RTC	Modified RTC
Requesting corrections in the RTC	7.9	18.6
Applying for a loan	51.3	25.6
Verifying the mutation	7.9	30.2
Verifying the ownership of property	6.6	11.6
Verifying the details of adjoining property	6.9	7.0
Producing the document in the court	7.9	4.7
Only to possess	23.0	25.0
Others	17.1	9.3

It is clear from above table, the users of Bhoomi kiosks made the visits for a variety of reasons. The largest proportion of users approached Bhoomi centers to obtain RTCs for applying for loans. The purpose for which RTC/document obtained can be seen in the chart given below:

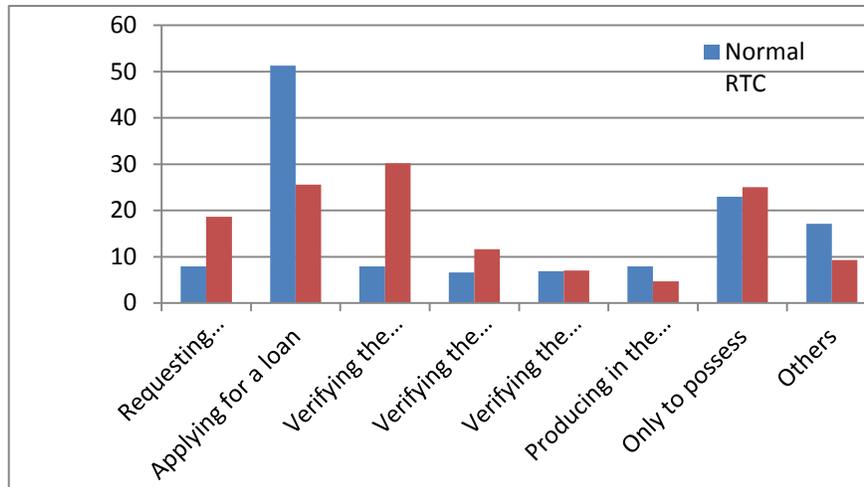


Chart 4 : Purpose for which RTC/document sought

7.0 Benefits

The Bhoomi kiosks were set up to benefit a large number of rural land owners in Karnataka. This section provides details on benefits to users of Bhoomi kiosks. These benefits are:

7.1 Ease in the use of the Bhoomi kiosks:

Table 11: Degree of difficulty of procedure

Degree of difficulty	Control (% respondents)	Bhoomi (% respondents)
Very simple	44.1	80.3
Simple	-	9.6
A bit difficult	40.7	1.5
Very difficult	15.3	8.6

As shows in table-5, In spite of the IT enabled nature of this service, most users of the Bhoomi system (80%) found the system to be very simple. Only 9% of the users of Bhoomi kiosks found the process difficult. This can be seen in the chart given below:

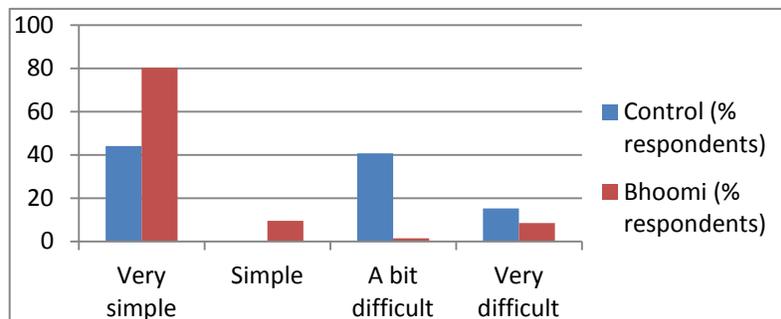
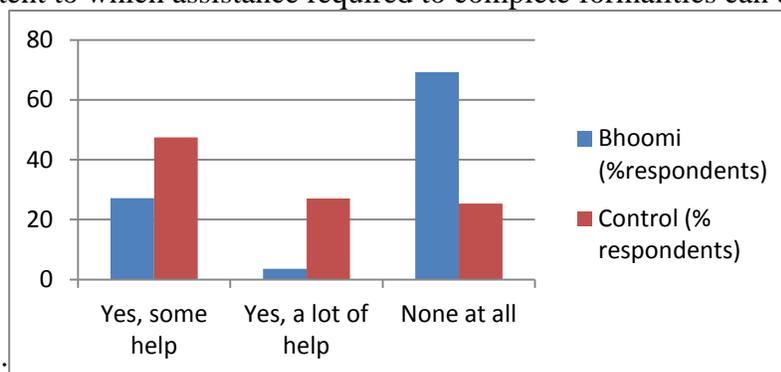


Chart 5 : Degree of difficulty of procedure

Table 12: Extent to which assistance required to complete formalities

Extent of assistance	Bhoomi (%respondents)	Control (%respondents)
Yes, some help	27.2	47.5
Yes, a lot of help	3.6	27.1
None at all	69.2	25.4

The ease with which the Bhoomi kiosks were used is reinforced with the feedback regarding assistance required by users to utilize the facility. Feedback from the users indicates that the Bhoomi kiosks were utilized by most users (69%) with little or no help, in contrast with the manual system (25%). The extent to which assistance required to complete formalities can be



seen in the chart given below:

Chart-6: Extent to which assistance required to complete formalities

7.2 Fast Service:

Table 13: Time spent at the counter

Time spent at the counter	Control (% respondents)	Bhoomi (% respondents)
<=10 minutes	27.1	42.4
11 - 30 minutes	35.6	33.9
31 - 60 minutes	25.4	12.1
More than 60 minutes	11.9	11.6

According to feedback from users

Speed of service was relatively better at the Bhoomi kiosks. As per above table-7, a large proportion of users (42%) were able to get the service at Bhoomi kiosks in less than 10 minutes, as compared to the manual system (27%). All the same, feedback indicates that one in four users (23.7%) have to wait for a significant period in the queue (more than 30 minutes), but this is better than the experience of those using the manual system (37.3%). The weighted average time spent in queues in the manual system was 27 minutes as against 21 minutes. The time spent at the counter by users can be seen in the chart given below:

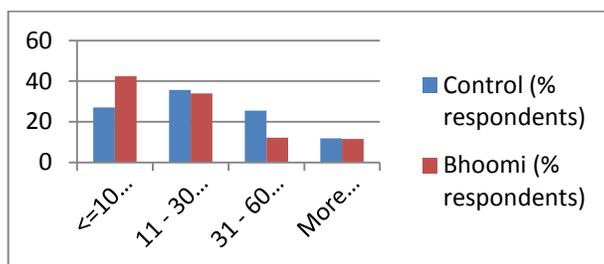


Chart-7: Time spent at the counter

7.3 Less complexity of procedures:

Government offices have elaborate procedures involving many levels of officials to maintain land records in a secure manner. The multiplicity of layers of officialdom that a citizen had to encounter was seen as a major problem. Feedback from the users indicate that the Bhoomi kiosks were utilized by most users (78%) without having to meet any official except the counter staff. This is in strong contrast to none of the control respondents being able to utilize Bhoomi kiosks by meeting just the Bhoomi staff. 19% had to meet one official, in the case of the manual system. The extent of complexity is reflected in the fact that 61% of the users of the manual system had to meet two to four officials for their work.

Table 14: Number of officials met

No. of officials met	Control (% respondents)	Bhoomi (% respondents)
1	18.6	13.1
2 -4	61.0	7.6
5 -7	18.6	0.6
> 7	1.7	0.5
None	-	78.3

Legacies of the manual system have not completely faded away. About 18% of Bhoomi users reported that the appointed village accountant, operating the kiosk, was not the person who signed the document. This can be seen in following chart:

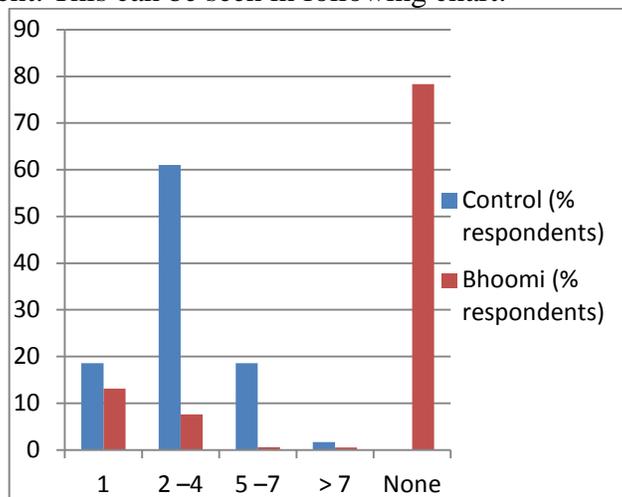


Chart 8: Number of officials met

7.4 Less errors in documents received:

The manual procedures had significant implications on the integrity of documents, and the possibility of errors coming out of indifference of the staff. Although the Bhoomi database is yet to be completely checked, it seems to be much better in providing error free documents. User feedback indicates that Bhoomi kiosks provided error free documents to more users (74%), in contrast with 62%, in the case of the manual system.

Table 15: Type of errors in documents generated

Type of errors found (base those finding errors)	Control (%respondents)	Bhoomi (%respondent)
Wrong entry of name / address / other	81.3	53.2
Misspelling of name / address / other	18.8	19.1
Minor error in entry of land details (eg.	93.8	21.3
Major error in entry of land details (size, type	31.3	4.3
Others		2.1

As per above table-10, among above reporting errors, wrongly spelt names were the most frequent error (81% in case of manual system, and 53% in the Bhoomi system). However, major errors in land details were the issue for 31% of those who reported errors in the manual system, in contrast with 4% in case of Bhoomi users. This can also see in following chart:

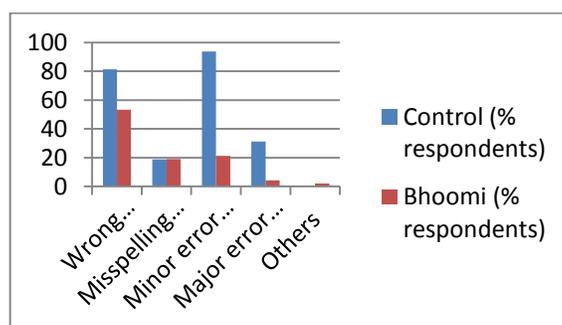


Chart 9: Type of errors in documents generated

7.5 Fast rectification of errors:

Almost all users of the Bhoomi system had confidence to complain about the system and sought rectification (93%) as compared to less than half (49%) in the manual system. (See Table given below)

Table 16: Institutional response to complaints

Response to complaints	Control (% respondents)	Bhoomi (%respondents)
Complaint not heard / official did not give time	25.0	8.9
Complain heard, no action taken	25.0	8.9
Action was taken; delayed	46.4	22.2
Action was taken; timely	3.6	57.8
Others	-	2.2

Timely response is a critical part of service delivery. Half the complainants (58%) got timely response in case of Bhoomi, while such response was reported by only 4% of those using the manual system. This can be seen in following chart:

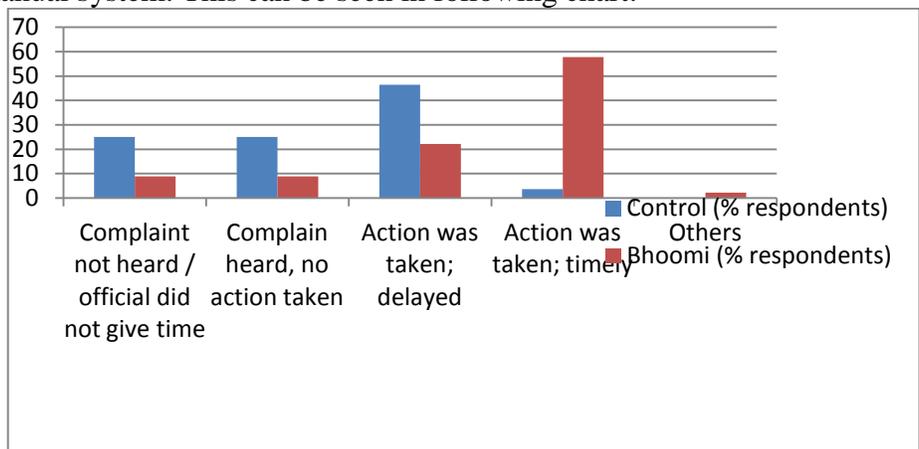


Chart-10: Institutional response to complaints

7.6 Low cost of service:

All users of the Bhoomi facility who wish to receive a hard copy of the RTC are to pay a fee of Rs. 15/- each and receive a receipt for the same. While this is a new charge levied by the government, it is meant to hold the person providing the service accountable for proper completion of the task. This is largely adhered to (95%), and excess payment reported by only a small proportion of users (5%).

Table 17: Amount paid to get an RTC

Amount paid to get RTC (Rs.)	Bhoomi (% respondents)
Less than 15	0.0
15	93.4
20	0.0
25	3.0
Greater than 25	1.5

This can be seen in following chart:

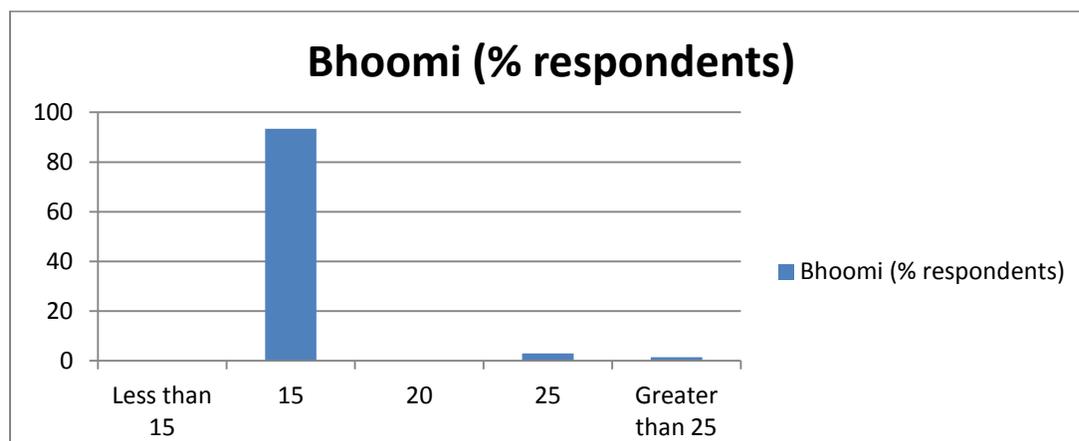


Chart-11: Amount paid to get an RTC

7.7 Low Hidden Costs of time and effort:

Citizens also incur hidden costs of time and effort to secure these land documents. Most Bhoomi users (42%) reported a minimal waiting time in the queue of 10 minutes or less, in contrast with 27% of the manual system who had to wait an equivalent time. Around 12% of the Bhoomi users waited more than an hour, as did users of the manual system.(See Table and Graph Below)

Table 18: Time spent at the counter

Time spent at the counter	Control (% respondents)	Bhoomi (% respondents)
<=10 mins	27.1	42.4
11 - 30 mins	35.6	33.9
31 - 60 mins	25.4	12.1
More than 60mins	11.9	11.6

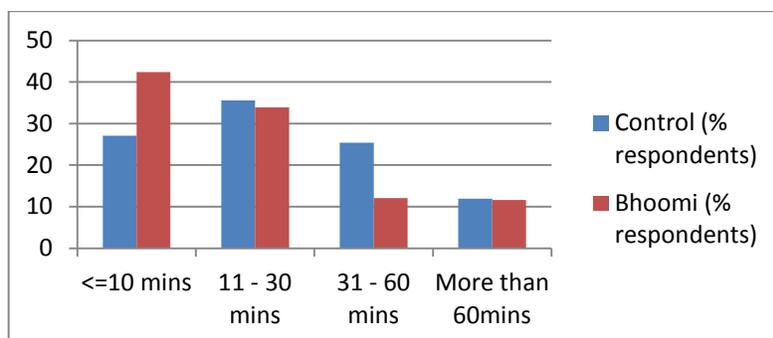


Chart-12: Time spent at the counter

A bigger issue is the number of visits a citizen makes to these offices to get the RTC. Most got the RTC (72%) with one visit to the Bhoomi kiosk, but only 5% did so with the manual system.

Table 19: Number of times returned from bhoomi centre/office without job done

Number of times returned without job done	Control (% respondents)	Bhoomi (% respondents)
Almost always	10.2	3
Half of the time	25.4	1
Sometimes	28.8	2
Rarely	30.5	1
Never	5.1	7

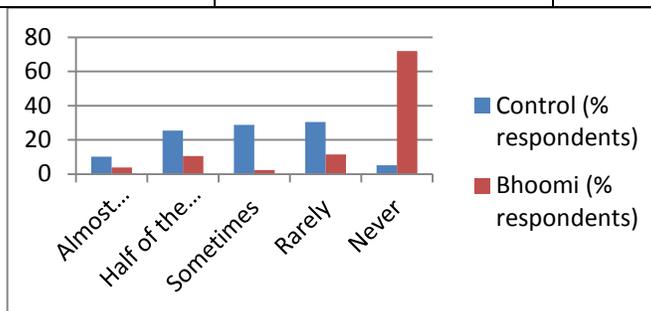


Chart-13: Number of times returned from bhoomi centre/office without job done

The most serious issue is that of corruption and bribery. Two thirds of the users of the manual system paid a bribe - 66% of them reported having to do so very often. In contrast, only 3% of the users of the Bhoomi system reported paying bribes. This can be seen in following Table and Graph:

Table 20: Incidence of paying bribe

Paid bribe	Control (% respondents)	Bhoomi (% respondents)
Yes	66.1	3
No	33.9	9

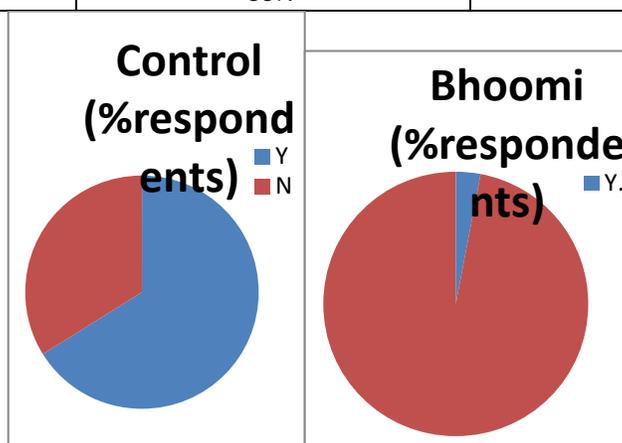


Chart-14: Incidence of paying bribe

7.8 Staff behaviour:

While technical capacity of the system plays an important role in its success, the approach of people who handle the task is of critical significance too. Most Bhoomi users (85%) rated staff behaviour at the Bhoomi kiosks as ‘good’; none of the users of the manual system rated the staff as ‘good’ but many users (63%) of the manual system rated staff behaviour as “average”. This can be seen in following Table and Graph:

Table 21: Rating of behavior of staff

Rating	Control (% respondents)	Bhoomi (% Respondents)
Good	-	84.8
Average	62.7	14.6
Bad	37.3	0.5

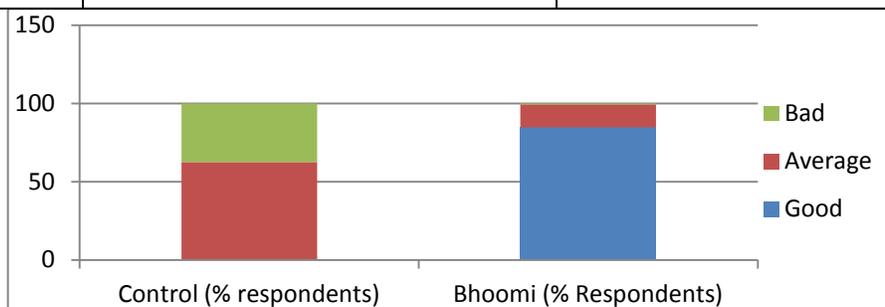


Chart-15: Rating of behaviour of staff

7.9 Tangible benefits:

Analysis of the project shows that about one fourth of the users are able to save on extra visits. Given that about 500,000 people use the Bhoomi system per month, the benefit in terms of man days saved is approximately 110,000 man days per month, and 1.32 million man days per annum. The benefit of wages from the man days saved, at the most basic level, is at least Rs. 50 per day (almost \$1 per day), which translates into Rs. 66 million per annum.

The bigger saving for citizens is on bribes they pay in the manual system. The weighted average value of bribe paid in the manual system was Rs. 152.46 per person, while that in Bhoomi was Rs. 3.09. This means that the shift to Bhoomi offers users a potential saving of Rs. 149.37. Even if we reduce the saving by the fee that they have to pay, of Rs. 15, the net saving is Rs. 134.37. This translates to a saving of over Rs. 806 million in a year.

7.10 Intangible benefits, in terms of shorter queues, lesser number of officials to be met, error free documents, timely response to complaints and better staff behavior . Similar benefits also accrued to Bhoomi users on timely response to complaints (58%) vis a vis users of the manual system (3.6%). A large proportion of Bhoomi users (85%) rated staff behaviour as good while none of the users of the manual system rated staff behaviour as good (63% rated it average).

7.10.1 Farmers

- Farmers can quickly get their land records from Kiosks and are protected from harassment and extortion. As against time delay of 3 to 30 days they now get their records in less than 2 minutes. No overhead cost is to be incurred. No application is required to be submitted at the kiosk. The records are authentic and legible. Use of biometric-based authentication system for updation of records have freed farmers from the worry of probable manipulation of their records by some unscrupulous officials.

- They can lodge application for mutation (change in land title) to their land records at the mutation kiosks, get acknowledgement for the same and can monitor the progress using touch screen kiosks available in some Bhoomi centers. They would then get their updated land record in a fixed time frame without the need of approaching any authority. As against earlier time of 70-200 days, mutation would now require less than 35 days.
- Farmers can also get the official status report of their request for mutation, which would let them know the stage at which their request is pending. This status report would help them in enforcing their right in terms of getting the record mutated in the prescribed time.
- Access to farm credit would now be less cumbersome. Online connectivity to banks would ensure farm credit to farmers in less than 5 days as against 25-30 days in manual system. It would be easier for the farmers to pursue land related litigation in the court

8. CONCLUSION

Bhoomi has achieved another elusive goal- it is one of very few self-sustaining e-governance services. The Ministry for Information Technology and Communications of India has announced that Bhoomi would be national model for Computerisation of Land Records and will be replicated all over the country.

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How Social Media Impacts Information Security in Organizations

Research Paper

Nadene Howard

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Applied Research in Information Assurance

Introduction

Over the last couple of years social media has really made a tremendous impact on our society. In 2011, the Nielsen report revealed that Americans spend 22.5% of their time online on social networks and blogs (Fire, Goldschmidt, & Elovici, 2013). This percentage has more likely increased as of 2013. We use online social networks to interact with other people, share experiences, pictures, videos, and other types of information. Social media is popular among youths because it allows them to express their feelings and receive feedback from others. Youths are not the only group of people who have adopted this new means of communication. According to the Ultimate Knowledge Institute, "Organizations are increasingly aware of the potential for social networking to address strategic needs and use social media as tools to support marketing efforts, enable greater collaboration, spread important causes and generate change" (Barnes, 2006). Social media is used very differently in personal atmosphere than professional atmospheres. As the use of social networks increases in businesses, the risks of attacks will also grow correspondingly.

This research paper intends to discuss social media from a business perspective and the impact it has on organizations if abused, as well as used properly. The paper will also state the different types of threats that are associated with information security in organizations if social media is used improperly. One of the major problems in organizations is that employees lack knowledge about information security and expose their systems to different threats without knowing. This paper will discuss if social media affects information security in organizations due to lack of knowledge from employees or intentional purposes. We will also identify what type of companies and the positions within the companies that abuse the use of social media. This problem will continue to rise among many organizations until employees are properly trained about the different risks that social media causes and how to prevent these risks as well as the consequences for operating business devices without work contents.

The purpose of this research is to first list how social media impacts information security and how an organizations systems may face certain threats due to social media. After listing the relationship between social media and information security, this paper will go into details about how these threats can really damage an organization. The paper will then review ways to prevent these threats and train employees how to transport information safely on all company devices. The main purpose of this research is to come to a conclusion of how social media is negatively affecting an organizations information security. Is it because employees are not properly trained and they are unaware of how easy it is for an attacker to corrupt all of the organization's information in seconds? Or is it that employees are aware of the danger that they are exposing their organization to but they just don't care, because they would rather partake in personal matters while at work. It could also be done to purposely destroy and sabotage an organization for malicious reasons. As social networking gains popularity, to allow this form of communication to run smoothly, one must know how to use it properly so that it doesn't cause a negative impact on their organizations.

Business use of Social Media

Many companies are utilizing social media as a tool to reach out to their customers as well as employees. Companies across a variety of industries, such as hospitality, banking, financial services, life sciences, retail, consumer products, airlines, automobiles, fashion, education and many more, are using social media to discuss

opportunities in market research. These companies are also using social media to assist with brand awareness, product and service promotion, customer service, customer understanding, product development, employee engagement, knowledge sharing, brand building and many more areas (Sandeep, 2012).

According to Sandeep, 83% of firms in India that use social media stated that without social media activity, marketing strategies would not be as successful (Sandeep, 2012). One of the main reasons that businesses are adopting the social network trend is because it is very low in cost and it is widely used and accepted by many people all across the world. Social network has evolved from a privilege to a necessity due to its positive effects on businesses. Social media tools are used to assist and further implement traditional marketing tools. A combination of both tradition and digital techniques are critical for marketing campaigns to work effectively. Many companies have included advertising through social media as a portion of their marketing budget.

Based on my interviews, most leaders feel that by utilizing social media in the workplace a brand can be built and communication will flow both inside and out their organization. Most large organizations' Public Relations department monitors their social network sites with one of the main objectives of receiving feedback from customers to improve and strengthen their brand, product or service.

Threats Social Media Causes

When social media is used correctly organizations will receive rewarding benefits, but it can also damage an organizations in many ways if employees are not utilizing social networks safely. As the use of social networks in organizations increases, users are now exposed to more threats. It is imperative that organizations assess all possible threats and weaknesses when evaluating their information security risks. The communication of the ACM presented a survey where top executives identified the top five threats to their organization and the results were 1. Deliberate software attacks, 2. Technical failures or errors, 3. Acts of human error or failure 4. Deliberate acts of espionage and 5. Deliberate acts of sabotage or vandalism (Whitman & Mattord, 2010). Attackers are exploiting every tool possible to achieve their goal. Because social media is at its highest peak, hackers will manipulate social media to potentially accomplish these threats listed above and look for all possible vulnerabilities.

Attackers are incorporating traditional threats, such as malware and phishing, with new advance threats such as socialbots and clickjacking to steal as much information as possible from online users. Fire, Goldschmidt & Elovici distinguishes threats by placing them in two different categories. The first category refers to classical privacy, security threats, namely, threats that not only jeopardize social network users but also non-social network internet users. The second category concerns modern social network threats, namely, threats that are mostly unique to the environment of online social networks and which use the social network infrastructure to threaten user privacy and security (Fire, Goldschmidt, & Elovici, 2013). Examples of classical threats include malware, XSS attacks, phishing or internet fraud. Examples of modern threats includes social bots, interference attacks, socwares, clickjacking and clone identity attacks.

One of the most popular threats that have been used for a long time and still affecting online users' privacy is malware. The attacker usually sends a message to the victim with some type of trojan in the message. As soon as the victim opens the message, the attacker gains access to the users private information such as credit card numbers, passwords, log-in information and much more. Malware in social networks use the social network structure in order to spread themselves between users and their friends in the social network. (Fire, Goldschmidt, & Elovici, 2013)

Phishing is another threat that has increased in social networks. Fire, Goldschmidt, & Elovici describes phishing as a form of social engineering to acquire user sensitive and private information by impersonating a trustworthy third party (Fire, Goldschmidt, & Elovici, 2013). Phishing attacks have increased dramatically because most people believe that they are communicating with someone they know and trust. Social networks sites have hired third party companies to watch for attackers by monitoring users activity in order to identify and protect users from different threats. Some example of these security companies are Checkpoint, Websense, and UnitedParents. These security companies' offer social tools and products to protect users in the online social network world. (Fire, Goldschmidt, & Elovici, 2013)

Literature Review

A review of existing literature from other writers relating to this topic was done to get a clear understanding of this area of study. Fahad, Fazl-e-Hadi, Ali Minhas (2012) discussed the different security and privacy risks in organizations as well as some proposed solutions to these risks in the article titled "On the Development of Comprehensive Information Security Policies for Organizations. The authors proposed that an organization is divided into five layers, which consist of environment, application, crypto, network and physical. Based on the layers provided above the main point of their study was for organizations to revise their information security policy by checking their security status at all layers (Fahad, Fazl-e-Hadi, & Ali Minhas, 2012). The authors agreed that the environment layer is the most important layer because it deals with all the layers of the organization. The environment layer deals with mainly the employees interactions to protect an organizations security. The environment layer includes employees' awareness, readiness, training as well as their attitudes. This article was very important to my study because my study is based on how social media affects the environmental level. My study is more beneficial because I apply an organization's information security to a specific tool that is being used in many organizations. Fahad, Fazl-e-Hadi & Ali Minhas' article did not provide examples and they failed to focus their study on an aspect of an organization. Focusing on a main situation or common tool will allow the reader to have a better understand of what is being discussed and to apply the situations to their own lives

In the article titled "Online Social Networks: Threats and Solutions Survey" Fire, Goldschmidt & Elovici (2013) presented a thorough survey on the different security and privacy risks which threatens the well-being of online social network users. The authors discussed different type of threats that social network users may face and solutions to protect them from these threats. The authors divide the threats into two main categories, which are classical threats and modern threats. They defined classical threats as threats that take advantage of a user's personal information published in a social network in order to attack not only the user, but also their friends, simply by adjusting the threat to the user's personal information (Fire, Goldschmidt, & Elovici, 2013) Modern threats mainly reside in the social network environment. These threats use the social network infrastructure to collect and expose personal information about a user and their friends and have even successfully lured users into clicking on specific malicious links (Fire, Goldschmidt, & Elovici, 2013). My research is different because I relate all these threats and attacks to an organization and discuss how these threats can affect an organization's information system. This article is imperative to my research because it categorizes both types of threats that put social networking users at risk.

I reviewed an article titled "A Privacy Paradox: Social Networking in the United States" by Susan B. Barnes. The article discussed how mass media has gradually replaced interpersonal communication. The article stated how people reveal their intimate thoughts and behaviors online, and how government agencies and marketers are collecting personal data about individuals. The author believes that this information is very important because our society has adopted social media as a mass mean of communication and if people are not cautious of the information that they place on social media sites it could really tarnish someone's reputation or harm them in numerous ways. I agree with the author that social media has gained popularity. There is always a new social network site invented daily; therefore, people must be careful and well trained in the proper way of using these sites so that their information is safe. Barnes concluded that social solutions, technical solutions and legal solutions approaches are the solutions to protecting privacy in online social networking sites. My research is different because instead of discussing the impact of social media to an individual, I compared it to an organization. An organization consist of more sensitive information than an individual because once an organization is attacked everyone in that organization's is threaten as well as all the organization's assets and information. Barnes, however, does not prove that her solutions surpass those of the existing literature. She did not thoroughly explain them and how she reached her final conclusion. Without the explanation, her solutions are weak and unsupported. Her points were not strong enough to capture the reader's attention.

The article titled "Policy Awareness, Enforcement and Maintenance: Critical to Information Security Effectiveness in Organizations" by Kenneth J. Knapp and Claudia J. Ferrante addresses the essential elements of security policy management and their relationship to overall security effectiveness in organizations (Knapp & Ferrante, 2012). The article discusses the importance of security policies in organizations. The authors believe that the three ways that an information security program is effective is through policy awareness, policy enforcement and policy maintenance. This article was extremely important to my research because an organization's information security policy is critical to every organization to ensure that employees are aware and trained in the area of privacy and

security. Sandeep (2012) work was intended to study the importance of social media and how it can be used by companies as a tool to reach out to customers. Sandeep discussed how different companies used social network as marketing tools such as, brand awareness, promotion and social causes, product development brand building etc. This article was significant to my research because it gave so many examples of how social media can be used in large organizations to small organizations as well. The article provided real companies and discussed how they implemented the use of social media into their organizations and compared the results due to social media. This article was significant and different because Sandeep explain how social media within companies can also be used to communicate to employees as well, which also has a positive impact on the company's growth. Slusky & Partow-Navid (2012) discussed student's practices and awareness to risk in their article. The authors feel that the problem with security awareness is that they don't fully understand the concept. It has been taught so they have knowledge about the topic but they don't apply it to their lives. This article raises a significant point because it explains that security information awareness is very important to learn but if you do not implement it in your daily life actions you will never really grasp the idea. My study addresses the complete opposite. Employees lack the knowledge about information security but are still trying to apply it to their jobs.

Hypothesis

Social media has a great impact on information security in numerous amounts of ways; however, it can also negatively affect an organization if it is not used correctly. After reading existing literature on this topic the three major scenarios of negative impact on organizations information security are due to:

1. Employees being unaware of their improper use of social media (untrained, not knowledgeable)
2. Employees being fully aware of what they are doing but just disregards the organization's policy (They don't care, would rather engage in personal matters, careless)
3. Employees intentionally planning to steal or sabotage the organizations information. (deliberate acts of espionage, deliberate acts of threat)

All of those scenarios play a role in the increase of attacks due to social networking, but I believe that the majority of attacks from social media are due to lack of knowledge and training; however, carelessness also plays a part in the negative abuse of social media. Employees are careless due to the lack of training and awareness. Some people are possibly aware of threats that social media can cause their organizations, but they are unaware of how serious these threats are and how much damage they can cause to an organization. Many people think it is acceptable to engage in their personal information on the job without further thinking about the outcomes of their decisions because they feel as though they won't get caught.

My second hypothesis is that job ranking also factors in how social networks affect information security at work. There is a difference between higher ranking and lower ranking professionals' intension in regard to misusing social networks. Listed below are the two factors where ranking may play a role in how social networks are abused:

1. Lower ranking professionals are likely to cause an attack due to the improper use of social media
2. Higher ranking professionals are more likely to steal information due to their access to critical information, as well as their knowledge and skills.

Methodology

This study intends to show how social media impacts information security in organizations. Along with existing literature on this topic, I will also use three methods to assist me with collecting data, which are surveys, observation and interviews. Surveys would be used solely for the purpose to gain knowledge about how employees feel about using social networks to assist them with their job responsibilities. I want to get an understanding of what professional rank uses social networks the most to complete their job responsibilities. An example would be higher ranking professionals such as PR managers or marketing managers incorporates the use of social media in their daily tasks. The survey will also reveal the employee knowledge on information security. The survey will be timed and it will consist of majority short closed-ended questions. The first couple of questions will be used to get a better understanding of the individual and their demographics. Two measuring tools that are used in the survey are the nominal scale and interval scale. The majority of the questions will be designed using the five points Likert Scale, which ranges from strongly agree to strongly disagree.

In order to observe employee actions at work I must target organizations that already use cameras to monitor their employees as well as customers' actions. I will retrieve the camera footage for the last year and review all the employees' actions when they are on the computer. I will observe to see if employees lock their computer screen or log off the computer when leaving their work stations. I will examine the employees' relationship with other co-workers and try to recognize if employees share their passwords or allow others to work off their username. I will especially be looking for intentionally and unintentionally bad habits and misuse of the social media in a professional atmosphere.

I also incorporate interviews in my research to compare with the surveys. It will be useful to interview the Human Resources department to gain knowledge of the type of training that the company provides regarding information security. Interviewing the HR department will also allow me to view and understand the organization's information security policies and use my observations to detect if it is implemented. It is imperative that I asked the same questions throughout every company's HR department so that I can compare the results from each company.

Results

While observing camera footage for the past year, I noticed that when most employees have little or no work to do they usually access personal social networking sites on the job if the sites are not blocked. Most managers have little or no time during the day to utilize social networking sites while at work. Managers are more interested in supporting their team and ensuring that their department is running smoothly. Accessing personal social networking sites at work presents a higher risk than accessing job related social networking sites. Personal social networking sites has a higher risk of threats because people usually access their personal sites from home or other networks that may not be protected from viruses or threats. If an attacker has already planted a malicious code into the social network infrastructure, when the victim opens that site from their work computer, they are exposing the infected website. The attacker can then get access to their information on their job's network. It is much difficult to break through an organization's firewalls and other security features due to the high level of security that most companies invest in, but the company would now be a target for the attacker. The attacker may keep trying get into the organization's network for a long period of time until he/she finally does. Security failures due to employees not using computer systems for its intended purposes at work can damage a company's reputation. This may lead to the result of losing customers due to trust issues and eventually losing profit.

Employees' awareness of security matters really affects the security and privacy of the company and the company's information. Awareness is defined as when employees have been properly trained and they know and are aware of security concepts. According to Knapp and Ferrante, Awareness represents a user's raised consciousness and understanding of security issues and strategies of how to deal with them (Knapp & Ferrante, 2012). Some examples of awareness enhancing activities include security briefings, regular reminders, formal training, ethical codes of conduct as well as the promulgation of organization policy describing the appropriate use of system resources (Knapp & Ferrante, 2012). If employees were aware of the threats that social network causes they may increase the risk of threats to their organization. According to Ludwig and Partow-Navid, "The major problem with security awareness is not due to a lack of security knowledge, but in the way the students apply that knowledge in real-world situations" (Slusky & Partow-Navid, 2012). An organization is a real situation; therefore it is very high in importance that employees know how to apply security awareness to their daily responsibilities in the work force.

Along with awareness training, another way to prevent threats through employees is assuring that they are prepared to handle situations if something occurred. Employees should be trained on different protocols and actions to take if they notice something out of the norm. A trained employee has the potential to save an organization from threats and vulnerabilities by ensuring the security of an organization. It is imperative that all organizations set their team up for success. The additional training may cost an organization more money but it will pay off in the long run.

By observing employees during the course of their day I noticed that most people are careless when it comes to protecting their workstations and computers. Most employees regularly step away from their work stations without properly logging off their computer. Some people even allow others to use their computers under their username. I

noticed that some people share passwords with other colleagues. The interaction with colleagues as well as the lack of attentiveness displays that employees trust their co-workers and they feel as though they are incapable of corrupting or stealing information from their computer or engaging in negative actions while using their computer or username.

A lot of people also keep many web pages open on their computer throughout their work day even if they are not utilizing the pages. Keeping tabs open, as well as sharing a computer with colleagues, places an individual at a high risk for threats. It is possible that if a trojan has been placed in a social media site, and if that site is open, the attacker will be able to view all of the other open web pages that the victim is accessing. It is extremely important that online users always properly log out and exit all websites as soon as they are finished using web pages. Logging off computer systems are simple actions that take a couple of seconds but if it is not done or done incorrectly it may tarnish and organization. Different studies have concluded that the major threats to information systems security are careless employees who do not execute their organization's information systems security policies (Fahad, Fazl-e-Hadi, & Ali Minhas, 2012).

Organizations must incorporate policies to ensure that employees are aware of what is expected of them and the consequences of abusing the company's policies. An organization policy is critical because it sets the rules and expectations of how employees should handle company's information and computer systems. Knapp and Ferrante stated, "Security policies are a critical safeguard to help employees understand how they need to behave in regards to protecting organization information and systems" (Knapp & Ferrante, 2012).

The survey reflects that a lot of lower ranking employees are not aware of the threats and vulnerabilities that social networks can cause their organization if abused. The survey also revealed that only managers usually use social networks as major tools to accomplish daily work tasks if it pertains to their job. Most lower ranking professionals attempt to access social networks sites at work because they feel as though no one prohibited them from doing so. However, the majority of the popular social network sites are blocked, but some employees have access to certain sites from work. This is definitely due to the lack of knowledge and training about information security policies. When interviewing the employees from the HR department, they all stated that there is a policy in their handbook which states "no engaging in personal relations on any company device." Slusky and Parlow-Navid incorporated in their work a recent survey of small and mid-sized U.S. businesses. These businesses revealed that the majority of them are increasingly dependent on the internet, feel safe from cyber security threats, but almost 80% of them have no formal cyber security policies in place within their organizations (Slusky & Partow-Navid, 2012). Most employees stated that they were also not aware of any cyber security policies. When I interviewed the Human Resource Department every organization's HR department confirmed that they do have an information security policy, which includes the cyber security policies and all employees must review the policy and sign it before they can begin working. Some organizations have just a section about information security in the policy hand book. Large technology firms have an information security policy handbook which is separate from all other policy information.

Policies change due to rapid changes of technology, so it is essential that either department managers, human resource managers or information security managers keep their team abreast of new information security policies as well as the old policies. Once maintenance has been done to ensure policies are still working by continuing to protect its information systems, companies must approve or recertify their policies. Once the policies have been approved by senior management the policy would then be updated and managers can provide refresher courses or hold quarterly meeting with their staff to review new information security policies. Knapp and Ferrante stated that by continually maintaining, updating, documenting and disseminating corporate policy will ensure that the policy will never become outdated or neglected (Knapp & Ferrante, 2012). The goal for any information security policy is for it to continue to shape employees behavior to ensure that they are on an appropriate track to securely complete their job assignments.

Conclusion

As stated above, this study is extremely important due to the increase use of social media in organizations. Social media has transformed into a major marketing tool. Organizations utilize social networking sites to assist with

brand awareness, promotion, advertising, product development and many more strategic goals. As the use of social networks grow in organizations, threats will also rise correspondingly. Attackers are now incorporating traditional threats with new advanced threats with the goal of capturing user's information faster and more efficient than before. Malware is still one of the most popular threats and it continues to affect online users' privacy. New threats that affects social media users include social bots, interference attacks, socwares, clickjacking and clone identity attacks, to name a few.

This study intended to show if social media affects information security in organizations due to lack of knowledge from employees or intentional purposes. My first hypothesis was true. Based on my study I demonstrated that majority of attempted attacks from social media are due to lack of knowledge and training as well as careless behavior due to a lack of awareness. By combining three methods, the use of observation, short surveys and interviews, I discovered that employees are not properly trained on information security awareness. By observing employee interaction with other colleagues for the last year I recognized that they were comfortable with giving passwords to others and allowing them to work under their username. Also most employees are unaware of the threats and vulnerabilities that social networks can cause their organization. When I compared the survey answers to the interview that was held with the HR department I learn that most organizations HR department only reviewed the information security policy once with their staff, which was their initial hire date. Therefore, if an employee has been employed with a company for over ten years they were not aware of the changes to the policy. To prevent careless mistakes that employees may make due to their lack of knowledge in this area, managers must update their information security policies regularly and inform their team about the changes.

My second hypothesis was false. Higher ranking professionals most certainly do have the ability to intentionally steal information due to their access to critical information, as well as their knowledge and skills, but my surveys and observation did not reflect that behavior. Based on my observations and surveys, I noticed that it was not common that many higher authority professionals was interested in stealing information due to the risk that was associated with doing so. Most of the directors, CEO, and managers I observed enjoyed their job and performed their job very well.

One limitation to my observation was that I could not document what high level professionals did behind closed doors due to privacy reasons. I cannot place a hidden camera in a CEO's office or install one on his/her computer to really capture if they purposely misuse social media for malicious reasons. To further extend this research I can review police cases of higher ranking professionals within companies that were convicted of crimes and gather more information on why they were convicted. I will also collect information on the company as well as their role within the company. This will allow me to review the data that was found to see if the result of their conviction was related to information extortion, espionage or other threats, which could be possible due to their position within the company.

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Current Status and Future Direction of Electronic Health Records (EHR) Benefits and Barriers / Challenges Faced by Various Healthcare Organizations

Name: Oresha Hodges
Bin Mai, Ph.D.
Bowie State University
Date Submitted: May 10, 2013

ABSTRACT

An electronic health record is a collection of patient health information generated by one or more meeting in any care delivery setting. An EHR typically includes patient demographics, progress notes, problems, and medications, vital signs, past medical history, immunizations, laboratory data and radiology reports. It's said to streamline clinician's workflow, and it has the ability to generate a complete record of a clinical patient.

EHRs focus on the total health of the patient. They go beyond standard clinical data collected in the provider's office and include a broader view of the patient's care. EHRs are designed to reach beyond the health organization that originally collected the data and are built to share information with other providers. EHRs' most notable benefit include a secure sharing of data, which, in turn, results in more open communication and more involvement on the patient's part (Anonymous, 2013), .

Information Technology will continue to be an instrument to improve the health care industry as benefits of using electronic health records are achieved. However, several issues and challenges will be observed when implementing such technology. In this paper, three related case studies will be discussed to demonstrate the benefits and barriers and challenges analysis of electronic health records as a general overview.

Introduction

Healthcare systems around the world are endeavoring to offer better care by reducing medical errors, through better medication management, rapid access to vital and accurate information, reduced duplication of services, access to a more comprehensive picture of health to promote advances in the diagnosis and treatment of illnesses, improved and informed decision making, and by providing continuity of care to patients. At the same time, stakeholders want to bring healthcare costs down to improve their financial futures (Mason, 2011).

According to Czar (2009), Healthcare Information and Management Systems Society (2007) defines the electronic health record (EHR) as

“a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports. The EHR automates and streamlines that clinician's workflow. The EHR has the ability to generate a complete record of a clinical patient encounter-as well as supporting other care-related activities directly or indirectly via interface-including evidence-based decision support, quality management, and outcomes reporting.”

With the user having access with the electronic health record data, he or she is able to quickly enter and retrieve data; the EHR follows familiar Graphical User Interface (GUI) conventions; the EHR allows personalization of documentation style, enabling it to meet the information needs of many types and categories of users; the EHR improves work efficiency and effectiveness; the user sees the EHR improving the process of documentation; and the EHR supports the regulatory requirements related to data content and security measures (Hebda, 2009).

Information Technology will continue to be an instrument to improve the health care industry as benefits of using electronic health records are achieved. However, several issues and challenges will be observed when implementing such technology. In this paper, three related case studies will be discussed to demonstrate the benefits and barriers / challenges analysis of electronic health records as a general overview.

Purpose of the paper

The purpose of this paper is to analyze case studies done on three health care facilities to identify the impact of their use of the electronic health record system. My objective is to determine if using a EHR system would better assist medical staff in keeping up with patient information. While having an EHR system implemented, will this cut down on the patients wait period? Will doctor be able to diagnose a patient's symptom by using an EHR? What happens if there is a breach within the EHR, what will be there backup plan? How many risk analysis should be performed to assure that patient information is not being missed used?

Note that the information provided within this research paper is based on three case studies and the information received was gathered from the World Wide Web. By no means is this information my own, but this is an ongoing research assignment.

Literature Review

The driving forces for the development of the EHR are client safety and the need to restructure the healthcare delivery system to improve the quality of care delivered while containing soaring costs (NCQHC 2006). The benefits of EHR can be best understood when considering the needs of various groups of users. According to Hebda and Czar (2009), general benefits of using EHR are to improved data integrity, increased productivity, improved quality of care, and increased satisfaction for caregiver. Benefits for healthcare providers by using EHR can reduced the misplace of patient records, improved efficiency of billing, better reporting tools, simultaneous record access by multiple users, and most importantly faster chart access because the need to wait for old records to be delivered from the medical records department is eliminated. Besides general and healthcare providers' benefits, using EHR is also benefited towards nurses, healthcare enterprises, consumers, and those individuals who are payers.

The Centers for Disease Control and Prevention found, in response to a mail survey last year that 38.4 percent physicians reported using full or partial e-records system. This is up from 25 percent in 2005. Starting in 2015, government reimbursements to physicians who are not participating in the federal e-record effort will begin to decline. The Department of Health and Human Services would be required by law to improve the adoption of e-records "over time by requiring more stringent measures of meaningful use." TwilaBrase, a registered nurse and head of the Citizens' Council of HealthCare, a grassroots group in St. Paul, Minn., says the "stimulus" bill should include explicit information consent before sensitive and confidential patient records are injected into a national database. "To protect the human, patient, and privacy rights of all Americans, the final stimulus bill must include an informed consent requirement," said Brase, who also warns that allowing federal officials to define "effective" care will lead to rational of it.

There are two pro-privacy components of the "stimulus" package. The first says that e-records holders "shall have a right to obtain" a copy of their data in an electronic format. The second includes a notification requirement in the case of a data breach if the information is not encrypted-although, according to the definitions used, no notification is necessary is the unintentional disclosure was made "in good faith"(McCullagh, 2009).

During a press conference sponsored by the medical journal Health Affairs and Brandeis University's Health Industry Forum, major insurance companies, provider groups, doctors, hospitals, and patient announced that they will team up to support so-called "meaningful use" regulations- guidelines that doctors and hospitals will have to follow to earn incentives for moving from paper to electronic medical files. This article also noted that almost every other sector besides health, electronic information exchange is the way they do business. Some examples

include a cashier scanning a bar code to add up your grocery bill and or checking your bank balance and taking out cash with a debit card that works in any ATM machine.

Despite the clear benefits of health IT, only two in ten doctors and one in ten hospitals use even a basic electronic record system. This means that patients spend too much time filing out the same form over and over. And doctors spend too much time writing down medical histories, tracking down x-rays and repeating expensive tests. For smaller practices and clinics in particular, the promise of greater efficiency and long-term savings was often overshadowed by the up-front cost of putting in an electronic health record system and the staff to administer it. Now, under the Recovery Act, providers will be able to earn substantial bonus payments if they adopt electronic records: up to \$44,000 in Medicare or almost \$64,000 in Medicaid for individual providers, and millions of dollars for hospitals.

To earn these incentives, providers will have to meet “meaningful use” standards which require that electronic health records are, in fact, used to improve the quality of care- to collect essential health data, support better clinical decisions, and given patients electronic access to their own medical records, so they can be full partners in their care. These systems must be able to encrypt information and automatically logoff users, among other safeguards

Two of the nation’s largest provider groups, Delaware’s Christiana Care Health System and Partners Healthcare in Massachusetts, said that in the future they’re going to train and support providers who adopt electronic health records, and avoid providers who do not make the switch to health Information Technology (Sebelius, 2010). In addition, effective September 1, 2012, the state of Texas is passing a law for health care providers, health insurers and clearing houses and other entities that use and disclose PHI of Texan residents using electronic health records. Some highlights from this law include the following:

Covered entities must provide patients with electronic access to their electronic health records within 15 business days of a written request. Initial HIPAA training must be provided to an entity’s entire workforce and repeated at least once every two years. Covered entities will have to provide notice to, and obtain authorization from, patients of electronic disclosures of their PHI, except for treatment, payment or health care operations uses. The Texas Attorney General may request the Department of Health and Human Services to audit a covered entity for HIPAA compliance. Any business- not just a covered entity- that conducts business in Texas involving PHI must provide notification to Texas residents in the event of breach. Any business failing to make required breach notifications risks penalties up to \$250,000 for a single breach. Any individual who accesses, reads, scans, stores or transfers PHI electronically and without authorization may be charged with a felony under Texas Law. This new law is more stringent than HIPAA, and imposes a variety of new requirements on Texas covered entities and others (Larose, 2011).

The venerable Stanford Hospital recently found itself subjected to negative publicity and a \$20million lawsuit due to breach of confidential patient data. A contractor’s actions led to the online exposure from September 2010 to August 2011 of 20,000 Stanford Hospital patient records (Sack 2011). Besides negative publicity and loss of consumer confidence, there may be stiff financial penalties associated with breach of patient data records. In June 2010, five California hospitals were fined \$675,000 for breach of confidential patient data. These fines were levied despite the fact that some of the hospitals discovered these breaches themselves during audit and disclosed the breaches (Gaynor, 2012).

Case Description

Case Study 1: Kaiser Permanente

Kaiser Permanente was founded in 1945, as an integrated healthcare delivery system that serves over 8 million members in nine states and the District of Columbia. Kaiser Permanente is made up of three distinct groups’ entities: the Kaiser Foundation Health Plan and its regional operating subsidiaries; Kaiser Foundation Hospitals; and Permanente Medical Group. The Kaiser Permanente online service that began in 1995 in Northern California region was fully developed to implement EHR (KP HealthConnect) in 2008 in every one of our 421 medical office buildings.

To evaluate the effect of implementing comprehensive integrated electronic health record systems on its use on quality of care, retrospective, serial, cross sectional study was done in the Colorado and Northwest regions of Kaiser Permanente. Consisting of 367,795 member in the Colorado region and 449,728 members of the Northwest region. The main outcome of using EHR was the determine the total number of office visits and its use of primary care, specialty care, clinical laboratory, radiology services, and telephone contact (Garrido, 2005).

Case Study 2: Primary Care Systems

Primary Care Systems, Inc. is a Federally Qualified community health center serving the residents of Clay County, West Virginia, and surrounding area. Primary Care Systems serves approximately 7,200 patients with approximately 30,000 patient encounters annually. Of the patients served, over 70 percent are covered by Medicare or Medicaid or are uninsured. The Medlynks system is a health centered configured version of the RPMS software platform that has been used by the Indian Health Service to dramatically improve health outcomes for trial populations in a number of ambulatory care settings. One of the aspects of the project that make Primary Care Systems truly unique is that it's the first community health center organization in the country to successfully implement an adapted version of the Resource and Patient Management System (RPMS) clinical information system developed and used by Indian Health Service (Chouinard, 2008).

In 2006, Primary Care Systems began implementing an electronic health management system, starting with care managers and clinical support team members and then expanding to physicians. The clinical teams of Primary Care System had a strong desire to help improve patient outcomes for diabetics and to assure that children and adolescents with obesity received appropriate weight management counseling (Chouinard, 2008).

Case Study 3: Cincinnati Children's Hospital

Cincinnati Children's Hospital is an international leader in pediatric health care, research and education, located in Cincinnati, Ohio. It is accredited by the Joint Commission (JC) and the Commission on Accreditation of Rehabilitation Facilities. During 1883, was founded based on "This corporation is not created for profit, but will reply for its establishment and support on the charitable and humane, and therefore is to have no capital stock (Anonymous, 2011).

The Cincinnati Children's Hospital wanted to implement an EHR to show the impact of offloading low-acuity visits to an alternative care site from the emergency department. In addition, the report evaluated the effects of EHR implementation on overall patient length of stay, time to medical provider, and provider, and provider productivity during implementation of the EHR. (Kennebeck, 2011).

Benefits of using electronic health records

Kaiser Permanente

Two years after electronic health records were fully implemented, office visits, primary care visits, and specialty care visits significantly decreased in both regions. Intermediate measures of quality of health care remained unchanged or improved slightly. Use of clinical laboratory and radiology services did not change conclusively. When asked to identify the major clinical factors driving the need for EHR systems, physicians gave the following as the top five: improve the ability to share patient record information among healthcare practitioners and professionals within a multi-entity healthcare delivery system; improve quality of care was generally stable and only occasionally improved performance on selected measures. Both regions are high performing, which may make it more difficult to identify marginal quality improvements. Health Plan Employer Data and Information Set data for reporting year 2003 placed Colorado among the 10 top performing health plans in the country for effectiveness of care measures and the Northwest among the Pacific region's five top performing plans; improve clinical processes or workflow efficiency; improve clinical data capture; and reduce medical errors.

Primary Care Systems

The improvement in outcomes from 2006 to 2007 was directly related to the use of information from the EHR and the implementation of the care model. Stated from Dr. Chouinard (2008) "These increases are not because we suddenly got smarter or practiced medicine in a different way- it's not like we all of sudden learn how to use insulin. The increase was due to the clinical staff being able to quickly run reports and follow up with patients." During the adoption of the EHR, the BMI on each patient was calculated and stored automatically with every visit. The EHR would allow for the creation of clinical reminders to aid the nurse or clinical coordinator to recommend counseling to these patients at the time of care, during the patient visit rather than retrospectively based upon chart audits. Without an EHR, the evidenced-based best practices were often only consistently employed by a specific provider with a particular passion for the issue or targeted condition(Chouinard, 2008).
Cincinnati Children's Hospital Medical Center

Their goal for this study was to determine the impact of offloading low acuity visits to an alternative care site from the emergency department during EHR implementation. In addition, they wanted to evaluate the effects of EHR implementation on the overall patient's length of stay, time to medical provider, and provider productivity during and after implementation of EHR. The implementation in the hospital was phased in over 2 years with the emergency department. During the implementation of the new EHR in the emergency department where they attempted to offload the volume of low acuity patient visits the overflow clinic remained open for additional time. Nursing and medical provider staffing were increased, 'superusers' were deployed in the department as well as a staffed call center. Staffing increased for 2 weeks immediately following the implementation (Kennebeck,2011). Overall the patients length of stay and time to doctor increased during EHR implementation. Attempts to reduce patient volumes by diverting patient to another clinic were not effective in minimizing delays in care during the EHR implementation. Delays in the emergency department throughput during EHR implementation are real and significant despite additional providers in the emergency department, and in this setting resolved by 3 months post-implementation.

Issues/challenges of using electronic health records

Kaiser Permanente

1. Caregiver Resistance:Physicians and nursing staff did not immediately embrace our EHR. 2. Implementing HIT in a clinical setting is tremendously disruptive and productivity reduced by approximately 20% in the first three to six months. 3. Security and confidentiality breach:In August of 2000,the confidentiality and integrity of personally identified health information (e.g. appointment details, answers to patients' questions, medical advice) of over 800 Kaiser Permanente (KP) members were breached when two programmers wrote a flawed computer script that concatenated over 800 individual e-mail messages instead of separating them. After the first message, each message included the text of all preceding messages to multiple members, a flaw that caused a breach in the confidentiality and integrity of the members' personal health information. Reasons at multiple levels account for the breach, including the architecture of the information system, the motivations of individual staff members, and differences among the subcultures of individual groups within as well as technical and social relations across the Kaiser IT program.

Primary Care Systems

The study did not identify issues or challenges faced using EHR. In fact the author emphasized that an EHR is only one component in the health improvement process and strongly expressed the fact that the clinical staff's willingness to embrace use of EHR made the benefits readily visible.

Cincinnati Children's Hospital Medical Center

Issues that came about during the study period the overflow clinic was operational before the EHR rollout and a new steady state period 9 months late with having the overflowing clinic and without the overflow. For each period during the study, the total number of patient visits, average LOS for discharged and admitted patients, time

to first provider and a time to room placement were all determine within the calculations. Even though there were no causalities that could be formatted from the data collect. It did appear that the EHR rollout was the largest contributing factor to the slowdown.

Compare and contrast

	Benefits			Challenges			
HER	Improve the ability to share patient record information			Improve the quality of care			
	Improve professional delivery system			Improve performance			
errors	Late Start Time		Patient Wait Time Increase		Reduce medical errors		
	No Challenges						
KP	X	X	X	X	X	X	
PCS	X		X	X			X
CCHMC		X			X	X	X

Key

EHR: Electronic Health Records

KP: Kaiser Permanente

PCS: Primary Care Systems

CCHMC: Cincinnati Children’s Hospital Medical Center

Given during the research of all three case studies neither health care organization went into greater detail as to why the given benefits or challenges were over one of the other. I have included that based on the fact that Kaiser Permanente satisfy all the benefits and only two of the challenges is because they had more resources both financial and global than the other two organizations. I believe that the Primary Cary System did not express any challenges is because they did not have enough funding and support to be able to implement the EHR system in their day to day operations as Kaiser Permanente and Cincinnati Children’s Hospital Medical Center. Now with Cincinnati Children’s Hospital Medical Center, I feel that since most of their resources are by donations and limited resources. I believe that most of their challenges are due to resources both financial and staffing using an electronic health records can assist them with gathering patient information.

In doing a compare and contrast of the Cincinnati Children’s Hospital Medical Center and Kaiser, one would have to say that using the EHR help assist each study in their own special way. There is an understatement that both studies needs to more research completed to determine what long term affects can take place by using the EHR system.

Conclusion

Implementing a new EHR system is complex based on resistance to change from a paper-based practice. Those who favor EHR-based systems prioritized having an open recognition of physician resistance, improved technical training, ongoing technical support, and sufficient protection of patient privacy. An important lesson learned from

this experience was that during the early stages of the transition, a cooperative environment, which was impediment: "At times 'it' exacerbated implementation challenges or encouraged passive resistance." Building a cooperative culture is important, especially when selecting an EHR product; however, during the implementation process, a directive leadership style may be necessary for success (Zandieh, 2008).

Last year, congress and the Obama administration provided the health care community with a transformational opportunity to break through the barriers to progress. The Health Information Technology for Economic and Clinical Health Act (HITECH) authorized incentive payments through Medicare and Medicaid to clinicians and hospitals when they use EHRs privately and securely to achieve specified improvements in care delivery (Anonymous, 2013).

Future direction for EHR

Although, the driving forces for the development of the EHR are client safety and the need to restructure the healthcare delivery system to improve the quality of care delivered while containing soaring costs, much must be done before the full benefits can be realized.

Even though the technology is available, progress towards an EHR has been slower than expected. There must be more involvement by the government and the private sector to make changes where possible to instigate, motivate, and provide incentives to accelerate the development of solutions to overcome the barriers.

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THE IMPORTANCE OF DATA TRANSMISSION WITH MEDIA ACCESS CONTROL (MAC) AND ERROR CORRECTION USING AUTOMATIC REPEAT REQUEST (ARQ)

Daniel N. Owunwanne
Howard University, Washington, DC, USA
dowunwanne@howard.edu

ABSTRACT

The data link layer of the Open Systems Interconnection (OSI) is responsible for getting a message from one computer to another without errors. It also accepts streams of bits from the physical layer and organizes them into coherent messages (frames) and then passes them to the network layer. Both the sender and receiver have to agree on the rules or protocols that govern how their data link will communicate with each other.

Media Access Control (MAC) refers to the need to control when computers transmit data. With point-to-point full duplex configurations, MAC is unnecessary because there are only two computers on the circuit. But, MAC becomes very important in a multipoint configuration in which several computers share the same communication circuit thereby requiring computers to take turns in transmitting data. Here, it is critical to ensure that no two computers attempt to transmit data at the same time in order to avoid collision. There are two fundamental approaches to MAC: Controlled Access and Contention.

This paper investigates and compares the throughput and the response time of both Controlled Access and Contention as communication protocols with empirical data. Because, collision will always occur in data transmission resulting in error transmission. The error(s) must be detected and corrected. Also, in this research, an analysis of error correction using Automatic Repeat Request (ARQ) will be performed to show whether Stop-and-Wait ARQ is more effective than Continuous ARQ.

Keywords: *Transmission, Data, Error, Detection, Correction, Protocol, Physical Layer, Network Layer*

INTRODUCTION

The data link layer sits between the physical layer and the network layer. It accepts messages from the network layer and controls the hardware that actually transmits them. As can be seen in figure 1 (page 2) below, the data link layer is subdivided into two layers, namely: the Logical Link Control (LLC) layer and the Media Access Control (MAC) layer. The data link protocol performs these three functions:

- Controls when computers transmit (*media access control*).
- Detects and corrects transmission errors (*error control*).
- Identifies the start and end of a message (*message delineation*).

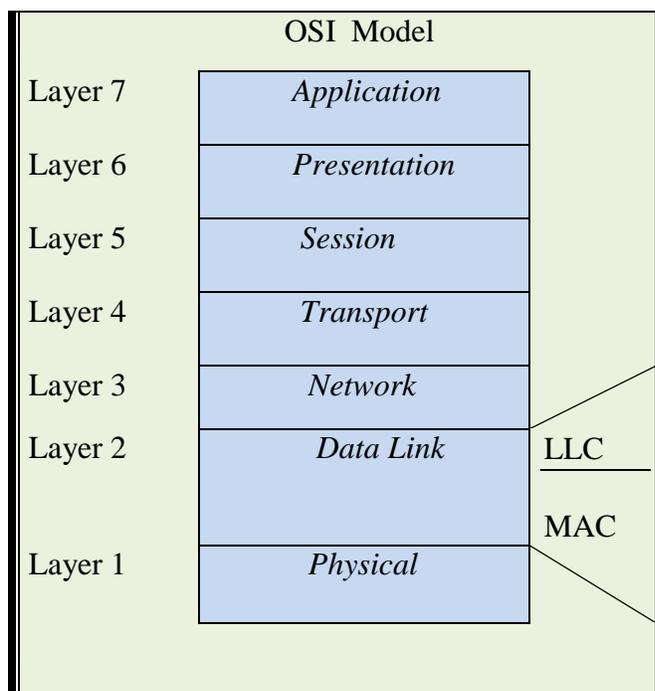


Figure 1: MAC Layer of OSI Model

MAC protocols are at the core of all forms of electronic communications involving voice, data and video. These protocols enable stations at diverse locations to regulate the movement of their packets and manage the network bandwidth in order to utilize the network resources as efficiently as possible. They are foundations in networks architecture and play a significant role in the performance of higher level protocols. All commonly used high-level protocols on the Internet, such as FTP (File Transfer Protocol), HTTP (Hyper Text Transfer Protocol), NV (Network Video for video conferencing) and TFIP (Trivial File Transfer Protocol), TCP/IP (Transmission Control Protocol/Internet Protocol) and ATM (Asynchronous Transfer Mode) protocol, use one or more low level MAC protocols, (Peyravi, 1999). Several important factors that directly affect the performance of a MAC protocol are described below.

MAC is a subset of the data link layer and it is adjacent to the physical layer in an IP-based network. The MAC layer is one that handles the mobility issues in an WiFi LAN (IEEE 802.11) network (Carr & Snyder, 2007), see the above diagram in figure 1. In the 802.11 MAC layer standard, the flow of information is performed on a *best-effort* basis which is also called *connectionless*. In connectionless transmission, the receiver does not verify the receipt (*Ack*) of the data by the sender. There is no guarantee that the data sent will be received successfully. One of the things an 802.11 system does to help ensure the successful receipt of information is to send the information repeatedly. As mentioned before, there are two fundamental approaches to MAC: *Controlled Access and Contention*, (Fitzgerald & Dennis, 2009).

Controlled Access

Most computer networks hosted by a mainframe computer use Controlled Access. In such networks, the mainframe controls the circuit and determines which clients can access the circuit (media) at what time. Controlled Access uses polling in data transmission. Polling is the process of sending a signal to a client that gives it permission to transmit or asks it to receive data. With polling, the clients store all messages to be transmitted. Occasionally, the server polls the client to see if it has data to send. If it does, it will transmit it, otherwise, it will

respond negatively and the server will ask another client if it has data to send, (Fitzgerald & Dennis, 2009). Polling is similar to a classroom situation in which a professor calls on the students who raise their hands. The professor acts as the server. To gain access to the media, students raise their hands and the professor recognizes them so that they can say something in the class. When they have finished, the professor again takes control (charge) and allows another student to say something.

There are several types of polling, such as *roll-call polling* and *hub polling*. With *roll-call polling*, the server works consecutively through a list of clients, (Fitzgerald & Dennis, 2009). First, it polls client 1, then client 2, and so on, until all the clients are polled. This can be modified to give higher priority to some clients. For instance, client 1 priority can be increased by using a polling sequence such as 1, 2, 3, 1, 4, 5, 1, 6, 7, 1, 8, 9. Typically, roll-call polling involves some waiting because the server has to poll a client and then wait for a response. The response might be an incoming message that was waiting to be sent, a negative response indicating nothing is to be sent, or the “time-out period” meaning the time may have expired because the client is temporarily out of service.

With *hub polling* (often called *token passing*), on the multipoint circuit, one computer starts the poll and passes it to the next computer which sends its message and passes the poll to the next computer. That computer then passes the poll to the next, and so on, until it reaches the first computer which restarts the process again.

Contention

Systems in which multiple users share a common channel in a way that can lead to conflicts are widely known as **contention** systems, (Tanenbaum, 2003). Contention is the opposite of controlled access. Computers wait for until the circuit is free (that means, no computer is transmitting any data) and then transmit whenever they have data to send. This method is also similar to *ALOHA* data transmission system. Contention is commonly used in Ethernet LANs. It is similar to talking with some friends. Each person tries to get the floor when the previous speaker finishes. Usually, the others yield to the first person who jumps in at the precise moment the previous speaker stops. Sometimes two people attempt to talk at the same time, so there must be some technique to continue the conversation after such a verbal collision occurs, (Fitzgerald & Dennis, 2009).

METHODOLOGY

This paper proposes to investigate the response time as well as the bits per second transmission rate of Controlled Access which consists of *Roll-Call Polling* and *Hub Polling (Passing Token)*. The result will be compared with the response time and transmission rate of Contention communication protocol. Each of these transmission paths has data transmission error rates which will be analyzed and corrected using Automatic Repeat Request (ARQ). The result from error control rate (error detection and correction) will be coupled with the throughput and response time of the system to determine the importance or the transmission efficiency of this system in the Data link layer of the Open System Interconnection (OSI).

THE SYSTEMS THROUGHPUT

Which Media Access Control (MAC) approach is best (Controlled Access or Contention)? The main thing that will help to answer this question is to consider the *throughput* of the two approaches. That is, the approach that will permit the most amount of data to be transmitted through the network within a certain time frame. For example, if a transmission system transmits data at 70% rate in a 56 Kbps communication circuit, the throughput of that system is 39.2 Kbps. Also, if another transmission system transmits data at 92.6% rate in the same 56 Kbps communication circuit, the throughput of the system is 51.9 Kbps. For instance, figure 2 below is an annotated graph representing the throughput of Contention and Controlled Access when the actual data of their respective transmission data rate and response time are plotted. The actual physical data will be shown in the graph in the subsequent version of this paper.

Long

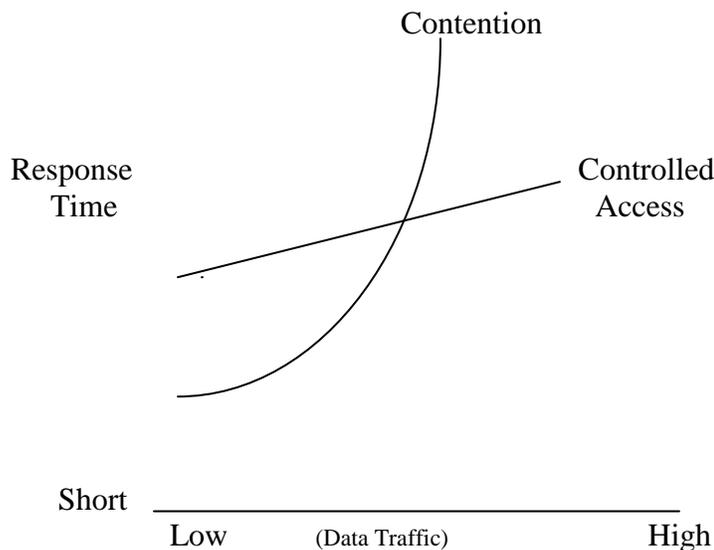


Figure 2: System Throughput

Meanwhile, as can be seen in figure 2 above, Contention works better than Controlled Access in small networks that have low usage. In this case, each computer can transmit data when necessary without waiting for permission, therefore, there is little chance of a collision. But, in Controlled Access environment, computers must wait for permission, even when no other computer needs to transmit, they must wait for the poll, thereby wasting the circuit's usage. On the other hand, for large networks with large usage, Controlled Access works better, because many computers want to transmit data and the probability of a collision in Contention environment is very high. Collisions are very costly in terms of throughput because they waste circuit capacity during the collision and require both computers to retransmit later, (Fitzgerald & Dennis, 2009). Controlled Access prevents collisions and makes more efficient use of the circuit, although the response time increases gradually.

ERROR CORRECTION

Collision will always occur in data transmission resulting in error transmission. Once error has been detected, it must be corrected. The simplest way, most effective, least expensive, and most commonly used method for error correction is **retransmission**. With retransmission, a receiver that detects the error simply asks the sender to retransmit the message until it is received without error. This is often called **Automatic Repeat reQuest (ARQ)**, (Fitzgerald & Dennis, 2009). The two types of ARQ are **Stop-and-Wait** and **Continuous**.

Stop-and-Wait ARQ

With Stop-and-Wait ARQ protocol, after each data packet has been sent, the sender stops and waits for a response from the receiver. After receiving a packet, the receiver sends either an acknowledgement (ACK) if the packet was received without error, or a negative acknowledgement (NAK) if the message contained an error. If it is an NAK, the sender resends the previous message. If it is an ACK, the sender continues with the next message.

Continuous ARQ

In Continuous ARQ protocol, the sender does not wait for an ACK after sending a message, it immediately sends the next message. As the messages are being transmitted, the sender examines the stream of returning acknowledgements. If it receives an NAK, the sender retransmits the needed messages. The packages that are retransmitted may be only those containing an error or the first packet with an error and those that followed it – called **Go-Back-N ARQ**. Continuous ARQ is by definition a full-duplex transmission technique because both the

sender and the receiver are transmitting simultaneously, that is the sender is sending messages while the receiver is sending ACKs and NAKs.

In the subsequent version of this paper, an analysis of error correction will be presented to show whether Stop-and-Wait ARQ is more effective than Continuous ARQ.

SUMMARY

To know or discover the transmission efficiency and the error correction rates of various data transmission systems is very helpful in determining and using the most efficient system. This helps us to avoid certain redundancies in the transmission circuits and unnecessary cost. The issue of transmitting correct data in the most efficient system is a very big concern in the world of Information Systems because data is processed into information which is used in making decisions in businesses and organizations. Any decision or calculation based on erroneous data is always detrimental to the organization.

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Improving Social Networking Security

Shauntrice Wilson

Bowie State University

Information Assurance Masters Degree Candidate

Social Networking Sites are one of the most remarkable technological advances of the 21st century. Social networking is becoming the preferred way to manage personal data. Billions of people use various social networks around the world to socialize and conduct business. This growth and advancement poses risks to users. Attackers are targeting users and users are concerned about personal privacy. Social Networking is an area where people take an active interest in how their personal information is managed and displayed rather than being passive account-holders. Social engagement provides a much-needed incentive for end-users to engage in processes such as setting privacy rules and providing feedback on spammers. Social networks represent the world's largest body of personal data.

This paper emphasizes the importance of security in social networking. It also offers several solutions to improving social networking security.

Introduction

The internet is filled with millions of individuals who are looking to meet other people, to gather and share first-hand information and experiences about sports, gardening, cooking, developing friendships, professional alliances, finding employment, business-to-business marketing, shopping, and even groups sharing information about recipes. The topics and interests are as varied and broad as the Internet itself. Although social networking is possible in person, especially in the workplace, universities, and high schools, it is most popular online.

A social networking service is an online service, platform, or site that focuses on facilitating the building of social networks or social relations among people who share interests, activities, backgrounds, or real-life connections. A social network service consists of a representation of each user, his/her social links, and a variety of additional services. Most social network services are web-based and provide means for users to interact over the Internet, such as e-mail and instant messaging. Online community services are sometimes considered as a social network service, though in a broader sense, social network service usually means an individual-centered service whereas online community services are group-centered. Social networking sites allow users to share ideas, activities, events, and interests within their individual networks.

The friends that you can make are just one of the many benefits to social networking online. Another one of those benefits includes diversity because the Internet gives individuals from all around the world access to social networking sites. This means that although you are in the United States, you could develop an online friendship with someone in Africa or India. Not only will you make new friends, but you just might learn a thing or two about new cultures or new languages, and learning is always a good thing. As mentioned, social networking often involves grouping specific individuals or organizations together. While there are a number of social networking websites that focus on particular interests, there are others that do not. The websites without a main focus are often referred to as "traditional" social networking websites and usually have open memberships. This means that anyone can become a member, no matter what their hobbies, beliefs, or views are. However, once you are inside this online community, you can begin to create your own network of friends and eliminate members that do not share common interests or goals.

Social networking Web sites, such as Instagram, Facebook, MySpace, Twitter, Google Buzz, LinkedIn and Friendster have become established forums for keeping in contact with old acquaintances and meeting new ones, for sharing personal information, and for establishing mobile communication capabilities. Users can create their own Web page and post details about themselves: where they went to school, their favorite movie titles, and their relationship status. They can link to friends on the same site, whose photos, names, and perhaps a brief description, will also appear on the Web page. They can communicate with friends and establish business contacts. They can also provide user-friendly tools which allow users to define, in considerable detail, how their personal profiles are displayed, both in terms of visual layout and the data fields which are displayed. Social networks also

provide sophisticated tools for searching and mining profile data. While these Websites are useful tools for exchanging information, there has been growing concern over breaches in privacy caused by these social networking services. Many users feel that their personal details are being stolen and/or circulated far more widely than they would like.

This study explores several different ways to improve the security of social networks:

1. Using social key trust to encrypt data

Using social key-trust to encrypt social data could be used as a basis for a smart way of encrypting data in social networks to strengthen privacy so that network members with an adequate trust level in their keys can see the data, but others, including possibly even the service provider cannot.

2. Implementing the use of identity cards

Identity cards as they pertain to social networking, include the use of a credit-card like instrument to place in a slot on the computer or mobile device to verify the identity of the user.

3. Implementing an identity management system

Identity management is about the management of data defining a person's identities. Facebook has the biggest repository of personal images on the Internet. It already contains some 30 billion images and more than 14million images are uploaded every day. Identity management systems do not just store personal data, they manage it, allowing query, transfer and display of the data in the system. Any identity management system must give its users control over who accesses which parts of their personal data. Usually this is based on knowing whether the person accessing the data fulfils certain criteria.

Literature Review

Sophos has called upon social networking websites such as Twitter and Facebook to do more to protect their millions of users, as new research is published examining the first six months of cybercrime in 2009[9]. The Sophos Security Threat Report examines existing and emerging security trends and has identified that criminals are doubly exploiting social networks, using them first to identify potential victims and then to attack them, both at home and at work[9]. In Sophos's opinion, Web 2.0 companies are concentrating on growing their user base at the expense of properly defending their existing customers from Internet threats[9].

Extensive research review was conducted and in the findings, it was determined that identity theft and authentication are fundamental problems in social networking and lie at the root of many of its security problems[8]. There have been proposals to pilot the use of identity cards in Social Networks, but none of them have got off the ground[8]. This could be because people have an instinctive aversion to using ID cards in an area which is supposed to be fun. Polish social network, *nasza-klasa.pl* users are permitted to publish fake profiles and data but are encouraged to do so transparently by the presence of a mechanism for reporting fake profiles. Reporting is not necessarily taken as a negative action.

On social networking sites, one is friends with the company president, mother-in-law, business partners, high school friends, last year's clients, and the neighbor down the street. The result is that social contexts and groups have merged, and one cannot separate professional from personal, public from private[10]. To address privacy threats stemming from interacting with other users on social networking sites, effective Social Identity Management (SIDM) is a key requirement[6]. A good IDM system provides a centralized approach for handling authentication within the enterprise, inside databases, and for cloud-based applications and Web services[7]. Janrain User Management Platform (JUMP) delivers a comprehensive profile capture, storage and management solution that spans from social login and site registration, to social sharing and single sign-on[1]. Janrain User Management Platform (JUMP) helps organizations succeed on the social web by providing leading technology to leverage the popularity of social networks and identities for user acquisition, engagement, and enhanced customer intelligence[1]. The firm has made more than 300 investments in leading technology companies that include Facebook (FB), Twitter, Zappos (AMZN), Chegg, Lookout, Tellme (MSFT), RigNet (RNET), Good Technology, BeachMint, HauteLook (JWN), Tumblr, ETF Securities, Tremor Video, LegalZoom, Wayport (T), NetSpend (NTSP), iPass (IPAS), Airvana (acquired by SAC Capital), HootSuite, ID Analytics (LOCK), ArcSight (HPQ), PlaySpan (V), Alibaba.com, Epocrates (EPOC), and many others[1].

Framework

Based on research of each of the three solutions offered to improve social networking security, it is hypothesized that using key trust to encrypt data will prove to be more popular than implementing the use of identity cards and/or identity management systems. While identity cards can be an option, we have to think globally instead of nationally. Individuals across all seven continents utilize social networking sites and computers and while it is understood that computers have basic functions, it also must be understood that all users computer devices aren't equipped with identity card slots or readers. Implementing an identity management system means users must have control over who accesses their data. While this may prove helpful, one must think about the extent a perpetrator and/or hacker will go through to obtain information.

Using key trust to encrypt data and implementing identity management systems will prove to be very popular if utilized together. Identity management systems allow users to grant access to persons of choice on different security levels, similar to government clearances. Unauthorized users can't access certain information. Key trust encrypts data with every keystroke. Not only will users be able to control what persons of interest can or can not see, their personal data will also be encrypted, allowing only those with access to see all, some or no information. Data in profiles could be encrypted in such a way that only private keys whose public component is signed by the data owner would be able to decrypt the profile data[8].

This study is being conducted to explore ways to improve the security of social networks. The survey instrument was developed based on research literature and the need to understand end user requirements regarding the security of their personal and private data as it pertains to social networking. Participants will be randomly chosen. They will be told that the objective of the research is to gather information about improving the security of social networks. Each participant must be a part of SOME social networking site. A disclosure will be read prior to the participant taking the survey and at any given time, the participant may choose not to participate in the survey. Requests for names will not be allowed as the participants will all remain anonymous. Anonymity is required so that no one else, outside of the researcher, can identify who participated in the survey and/or why. The participant must however, provide the researcher with a username, making sure to exclude social security numbers, nicknames, etc..., in case a retest for reliability measures is required.

Each piece of data extracted from the surveys will be analyzed on a nominal scale and calculated to decide which method end users choose. The data needed to solve the problem will be extracted from the surveys produced by the researcher and answered by the randomly chosen, social network-utilizing participants. The data is located in the participants responses to the questions in the surveys. The data will be secured by accurately tabulating all of the responses of the participants to the survey. After tabulating the data, the responses will be broken down into categories that reflect the support and opposition of each security mechanism. Each category will then be carefully reviewed to identify the characteristics of each.

Results

Participants are expected to gain an understanding of the different methods introduced to improve social networking security and provide their feedback to offer the most popular method to implement to secure personal data.

The results are expected to show the most popular vote between key trust, identity management systems, and identity cards. Based on a preliminary study amongst several Bowie State University Graduate students, results showed identity management systems was the most popular among users to protect their personal data; key trust was second, and ID cards last. That same study showed that identity management systems would be BEST (cost efficient, effective) for the sites/companies to implement to protect user data, key trust placed second, and no one voted for identity cards. The students were also given the option to choose the two methods to implement that would work BEST together, as I projected, identity management systems and key trust together were the most popular. Others voted for ID cards and identity management systems.

When the actual research process is conducted, similar results from the preliminary test will be expected. Majority of the participants will vote to implement key trust from a user standpoint. Key trust will rank most popular because it is a smart way of encrypting data. Users feel safe knowing their information is hidden. Data from social networks is encrypted using a public key. This is used to export the data in a secure way and transport it between social networks. The private key corresponding to the public key is used to decrypt the data. Data in profiles could be encrypted in such a way that only private keys whose public component is signed by the data owner would be able to decrypt the profile data. It is projected that users will choose to implement identity management systems from a business standpoint because social networking sites fulfill all the main criteria to

qualify as mainstream identity management applications but a big difference between Social Networks and state of the art IDM systems until recently has been the openness of their architecture[8]. When asked to choose which two methods together will improve the dynamic of social networking security, it is projected that identity management systems and key trust will be the most popular. Implementing key trust, data could be encrypted when inserted into the Social Network provider's database to provide extra privacy, and as stated above, social networking sites are already on the brink of being identity management systems.

Conclusion

This research was carefully prepared but there are limitations and shortcomings. One of the biggest limitations faced during the research process was that most of the resources that were consulted were a few years outdated. The research itself will be conducted randomly over the course of two weeks. Two weeks is not enough time for the researcher to collect all of the data from random participants. The research would be more effective and efficient if it was conducted over a longer period of time, it allows the researcher to reach more people randomly. Second, over the course of two weeks, randomly, the population of the experimental group will be small, some twenty-five participants will be accounted for. Third, since the questionnaire is designed to measure the participants' opinions towards the different ways to improve the security of social networks; it seems not to provide enough evidence of the students' actual feedback about improving social network security. In addition, since the assessment will be conducted by the author, it is unavoidable that in this study, a certain degree of subjectivity can be found.

Moving forward, the survey will be expanded to offer more questions geared towards getting an actual understanding about how users feel about the security of social networks, its current state, and what could be done to improve it. As mentioned, social networking sites are already considered to be identity management systems. Further research can provide answers as to why they are similar to identity management systems but can't be categorized as IDMs just yet.

Aside from not using these sites at all, end-user education, is the most fundamental protection that exists. A well-informed user will not only help to maintain security, but will also educate others on these issues and establish best practices which can be standardized and updated as applications mature or as new applications come along. The more information you post, the more information becomes available for a potential compromise by those with malicious intentions.

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Appendix

Improving Privacy and Security in Social Networking

Please provide a unique username making sure to exclude social security numbers, nicknames, etc..., in case a retest for reliability measures is required.

1. Do you utilize social networks?

- a. Yes
- b. No

2. What Social Sites do you use? (circle all that apply)

- a. Twitter
- b. Facebook
- c. Myspace
- b. Instagram
- c. LinkedIN
- d. Tumblr

4. What age is your age range?

- a. 18-25
- b. 25-35
- c. 35-45
- d. 45+

5. From your understanding of the options provided to improve social networking security, which option would you implement to protect your personal data?

- a. ID cards
- b. key trust
- c. identity management systems

6. From your understanding of the options provided to improve social networking security, which option do you think would be BEST (cost efficient, effective) for the sites/companies to implement to protect user data?

- a. ID cards
- b. key trust
- c. identity management systems

7. If you had to choose two options to improve social networking security, which two would they be?

- a. ID cards
- b. key trust
- c. identity management systems

Security Polices to strengthen Communication between Mobile Phones and Cloud Services.

Olanrewaju Olukunle
Bowie State University

ABSTRACT

Protecting data and identity has become a growing concern this century and this has resulted in many researches. But as the increase in privacy concerns have grown, so also has the increase in the cloud computing and mobile cloud computing. A lot has been put in place as regards the confidentiality and integrity of data technical especially in terms of supercomputers, small scale business and even larger corporations. But few have been done in terms of mobile computing (Smartphones).

This paper proposes a method of constructing an authentication infrastructure that helps to secure data being sent from Mobile phones. This would be based on a flexible framework that helps to support authentication decisions. This would ultimately help bridge the gaps of trust when in comes to sending of data to the cloud and the use of data within the cloud service.

Introduction

The fact that Cloud computing has brought a cheap for companies who have decided to move their services, data and platforms to the cloud, it has also brought about a commercial aspect to it, whereby many corporations have built data/cloud farms around the world and have created avenues whereby storage spaces have been created for customers to buy.

A lot of research has been done in respect to the Confidentiality and Integrity of data to the cloud and around the cloud when it comes to computers and large infrastructures and secure information across organizations are getting more and more secure with the help of virtual domains and strict policies that help to curb lack of confidentiality; but it does not help secure information being sent across Mobile devices. It also does not solve the problem of theft.

Due to the increase in privacy to corporations, hackers are beginning to find other means of getting information and it's through the use of mobile devices. Especially with the use of applications which connect personal phone numbers and personal identities of members who unknowingly accept the applications and have become vulnerable to attacks like the man-in -the-middle-attack, Meet- in- the-middle attacks [2].

Some may wonder how possible it is. Well it is as simple as downloading a cloud app on a mobile device which is connected via an email account and a drop box of the application resides on the client's computer [1]. There is no adequate authentication service put in place to secure that the right persons have access to information stored up in the space except for the email password.

Hence, we intend to address these issues with what I describe as an independent policy-based cloud authentication platform, which involves the use of user specific security policies. Although a lot of people would argue about the need for a complex computation to devices, it would affect their battery life. What we intend to achieve is to bring security policies that would constantly change device integrity and user credentials.

We intend to use pseudorandom generated pins along with the AES encryption system for users to log-in into the systems. [3]

Problem Statement

Based on the above introduction, it is possible to identify two crucial problems that we have coined in our investigation. Our first problem area is the fact that there is no adequate security when it comes to accessing a

personal cloud server from a mobile phone. While there is strict security policies put in place to ensure authenticity in other systems, the mobile devices are being left out. The second problem involves how people understand the need for policies that would help secure cloud data integrity when it comes to the issue of physical theft of items and mobile devices.

The Research Question: Security Polices to strengthen Communication between Mobile Phones and Cloud Services.

Review of Literature

In order to solve our problems which we specified above, it is essential to review findings and issues associated with cloud computing done by other persons. I would be reviewing this issues under process steps.

i. The issue of Data Loss Prevention;

Human factor which we all know have been the cause of many security breaches and vulnerabilities so a Data Loss Prevention system [4] was created. The function of the DPL is to introduce a proxy that will intercept and analyze any outgoing traffic from enterprise networks. The proxy was designed using methods from pattern matching to fingerprinting. While these techniques detect confidentiality in enterprise systems, it does not control data propagation after the file has been moved to the cloud, and it only is effective for enterprise networks. We all know that with mobile devices access to very important information are just one click away; information like bank accounts, health records and corporate intellectual properties or even politically sensitive information are just easy to get. The penetration rate at which cell phones are being hacked or even stolen is 100% or even greater. I would highlight my point in the following scenario[4].

In the first scenario, we consider the case of the DROP BOX app on mobile phones which connects directly through a folder to a client's computer and a shared drive on the web. The authorization request is occurs just once and it is the client's email address. Many cases of emails being hacked occur every hour of a single day. There is high possibility that once an email address has been hacked, they can get control of all accounts that are connected to the email address. (note that the shared drive was not interacted with, but the fact that most applications on the phone require the e-mail account, the e-mail being hacked can result in the data within the cloud to have a loss of integrity and confidentiality).

In the second scenario, A medical Application which is not protected by being used within the context of a Hospital, could contain important health information that relates to a client's health history or even a doctor's appointment and subscription, would not be protected when the mobile device falls under the wrong hands (theft). This information can be tampered with.

A third scenario that comes to mind is the issue of an employee who uses his phone to access the corporation's internal portal. The phone stores the cache of information gotten from the company's page and once it has been hacked into, the important information loses its credibility.

Limit in Knowledge about architecture:

"Three broad classes of public clouds exist. The first class entails those with services that are provided at no cost to the consumer and are instead supported through advertisements. Search and electronic mail services are well-known examples. Such services may be limited to personal, non-commercial use. Information collected at registration and during use of the service may be combined with information obtained from other sources and used to deliver personalized advertisements to the consumer. Protection measures such as encrypted communications with the service may also be missing." [5].

Barkakati (2012) Suggested that password be set and limit the use of public wireless connections, he states that attacks to connections of sensitive transactions would be greatly reduced. But my concern to such idea is that it does not help solve connections of high speed Connection being offered to mobile devices by their carries.

The article "Mobile Device Location Data" The article "Mobile Device Location Data" emphasizes how using social networks on mobile devices allow others to locate where users are currently located. The use of Mobile phones in the recent years has greatly increased in double percentages. More people now own different types

of Mobile devices than land phones and a greater percentage of Financial CEOs use the mobile devices on their trips all over the world to get information pertaining to their various organizations. Thus the risk of attacks via mobile devices is higher than it is been realized.

From the above caption, many applications which have been released to the public as regards cloud storage at no cost fall into this category and once protective measures are being taken away, important information of clients become a high risk.

It is my responsibility in this paper to create adequate security policies that would increase the level of security in terms of data transfer when it has to do with mobile devices.

Issue of service Agreements

While a lot has been said in terms on technicality on Confidentiality and Integrity, the legal aspect has often times been ignored and I believe as the tides of security concerns are evolving, so should terms of agreement which covers both the clients and cloud servers. The terms of service are often times being prescribed by the cloud providers and they are most times not written based on federal Privacy and security requirements. Furthermore, modifications to the terms of service are unilaterally updated without any notification to the cloud customer [5]. These changes could affect the benefits of the clients and needs to be addressed.

This paper proposes a method of constructing an authentication infrastructure that helps to secure data being sent from Mobile phones. What I propose is the creation of an authentication that connects within the transport layer which operates by.

First is having a secured AES encryption password authentication when the user needs to log into the cloud storage. After the user logs in and is done with the storage, the connection is automatically logged out once the page is exited.

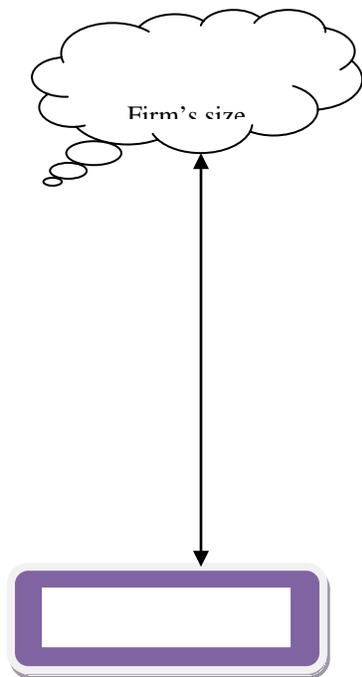


Fig i. Original model

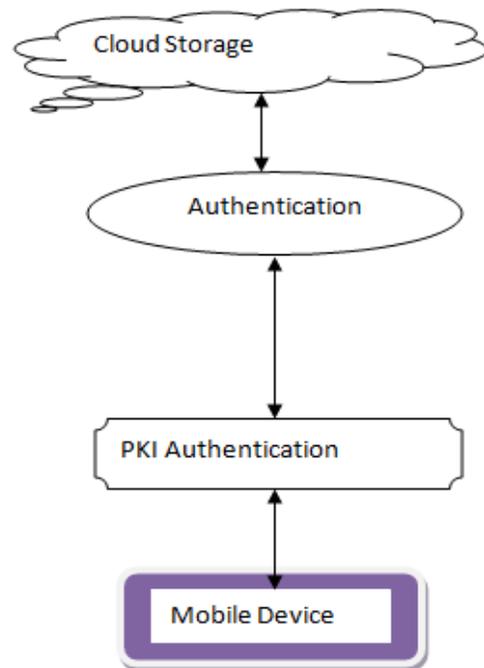


Fig ii. Proposed model

Fig I above is the normal and current process being used by all mobile devices to connect to the Cloud servers like drop-box; Fig ii illustrates the proposed model we hope to achieve in this paper.

Research Plan

In other achieve our goals of ensuring adequate security policies between Mobile phones and Cloud communications; we would be designing a framework architecture by which an authentication page would be created on mobile devices which would be different from user's email addresses.

We would also be reworking security policies and service of agreements between cloud users and cloud servers, which would be short and easy to read and understand by the users.

We would be testing our proposed model with user's reactions to the improved security features as regards to log-in and automatic sign-out which would be different from the automatic access they have into the storage servers.

Proposed Model

The concept of the proposed model is to increase the level of confidentiality and integrity of mobile phones connectivity to the cloud servers. The proposed model Fig 2 above entails 3 levels of security;

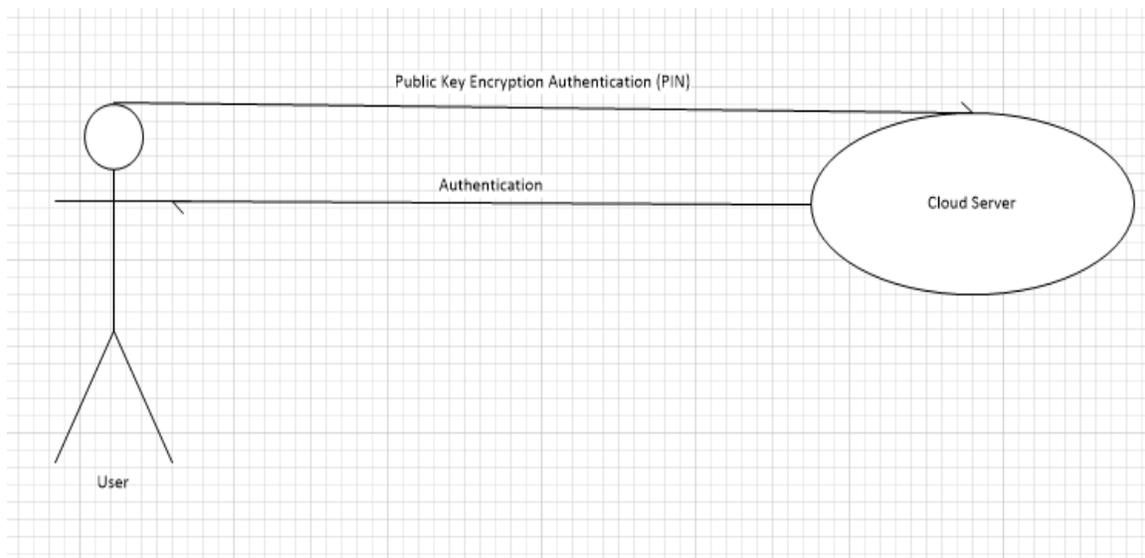
1. The First Important level of security is the Log-in credentials that the mobile device must have to access the Cloud storage. The reason for this authentication is to ensure that every time the user tries to connect the cloud, he would require putting a PIN. The reason for this is to ensure that right person is the one who is able to log into the cloud server.
2. The second Level of Security is the authentication by the Device that the Cloud server is genuine and is not a masquerade or an hacker mirroring the cloud server.
3. The third level is the encryption of the message passing from the cloud and transferred to be encrypted securely to avoid the data being attacked or hard to monitor by hackers.

Mode of Operation

The First Layer of security would be using the Public Key Encryption (PKI) form of Authentication between the Mobile device and the cloud server. The way this would play out is that, both ends would have a private key which would be secret to them and a shared public key which both of them would use as exchange to validate each other. Once the public key being sent to each other do not synchronize with the private key each person has, then there is a lack of confidentiality and access would not be granted by the user to the server.

This Authentication would appear as a Personal Identification Number (PIN). the user would have to type the PIN on the mobile device to gain access.

The second level of Security would be at the user's end which would be checking the validation of the Cloud server. The Public key being sent by the Cloud to the user is what would be used, If the Public key does not match at the User's end, the user would get a connection error message to inform the user that the server is not what it



says it is.

Fig III

The Illustration in figure III above gives a view of how the Integrity of both the user and the cloud is being verified and securely.

The next step after access has been secured and there is connection between the cloud servers and the user's mobile device, the mobile device begins to synchronize information between the cloud servers and the mobile Device. The information being sent across would be an encrypted data being sent across so it would be hard for anyone listening to identify what is being sent. The mode of encryption would be the Advanced Encryption Standard (AES) which entails using the same key to encrypt and decrypt the information. The way it would operate is that the data would be encrypted and broken down, after which it is encrypted further before being transmitted.

After the synchronization has been confirmed, The Cloud server sends a message to the user letting him know he has received the information being sent across and there is no deniability that the message was not sent or received. This Process is called Non repudiation.

Once the message has been sent and confirmation received, The user can log out of the cloud network by clicking log-out or if there is no activity after a certain period, the connection would automatically be disconnected as a security measure, the user would have to log-in to connect again.

The whole process of this model can be illustrated below in FIG IV:

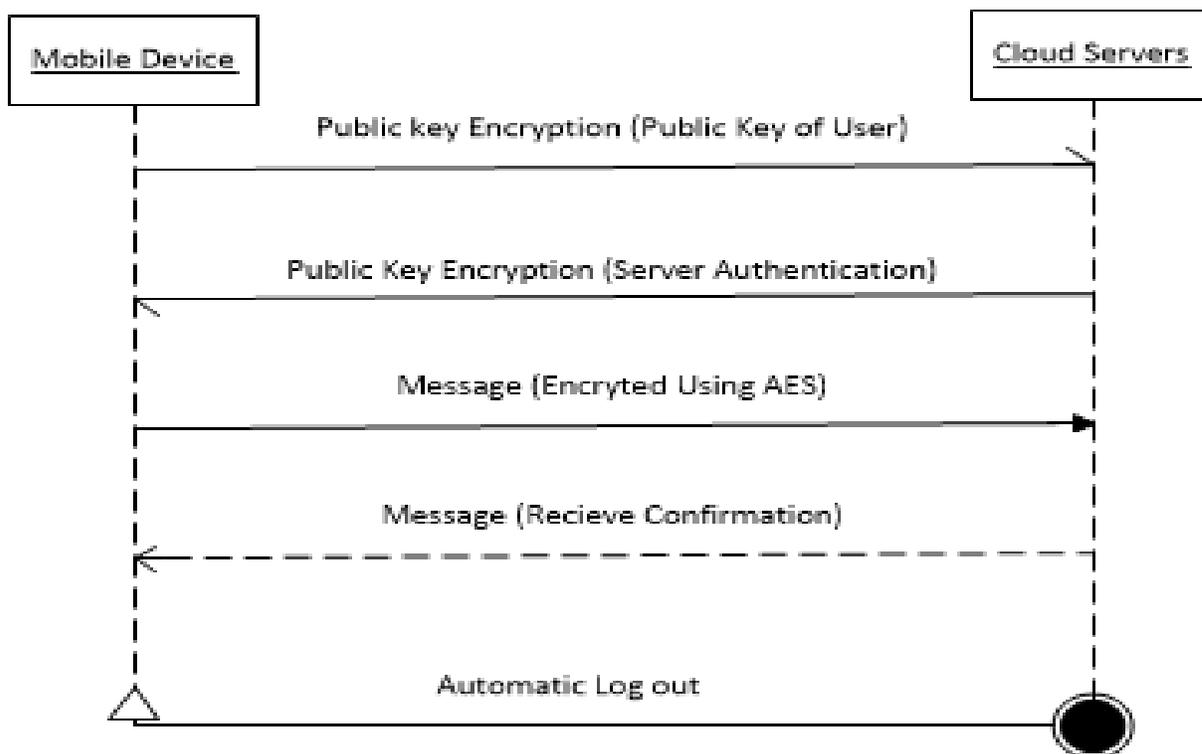


Fig IV. A full look of how the model would work.

Case Study – Drop Box

The drop-box is an ideal example of how we hope our proposed model is to operate. The drop box is a cloud storage that is being used by everyone to synchronize files from their mobile devices to the web and to mobile devices. Since our primary model pertains to mobile devices, we would concentrate more on the mobile security aspect of the drop box. Mobile devices as we stated earlier could be physically stolen or hacked via a user’s email address, and thus with the norm of use by the drop box, it is easier for whoever who steals the phone to get all the information of the user stored in the cloud and thus it defeats the issue of Confidentiality of the data in the cloud or the integrity of the user. This new proposed model which ensures that all users would log-in before access would help to secure the information in the cloud. I.e. even if the phone has been physically stolen, the thief would still not have access to the information in the drop box.

iCloud

This is another type of drop-box which is being used majorly by Apple users, authentication of credentials would secure information on Ipads and Iphones from being hacked or used.

Service of Agreement

It is essential that users understand the level of security that each cloud server is offering, and it is also important that the value of security should not be undermined by the amount a user can pay to the cloud servers. There are basic Issues that are important for all cloud servers to have for all users connected to their servers, they include certain permissions and grants.

The User should have the right to set if he wants his Location to be discovered or not.

The user should be given the right to set if he wants to grant his personal information taken and also who and who should have access to his communication. It is important for Cloud servers not to break the rules being set by Standard bodies like HiPAA and NIST.

Benefits of Our Model.

The benefits of this model have been stated earlier but I would highlight them briefly and they include:

- i. Ensuring that the data is kept secure within the cloud.
- ii. Increase the confidence of users to keep their personal information on the cloud.
- iii. Ensure that the right person is the one logging on to the cloud.
- iv. Ensuring that the servers go the data and transportation to the cloud server and within the cloud is Secure.

Conclusion

The research question of how do we secure our information communication and the data when connecting to the cloud servers from our mobile devices has been decisively dealt with in this paper, it gave a brief history on cloud computing and how technology has grown over the years with the use of mobile devices being used to connect to the cloud via Drop boxes. We proposed a model where by a user has to input a pin to log-in to the cloud server and an authentication must be sent back to the mobile device to ensure a connection. After the connection has been made, we explained how information would be passed securely and how the connection would be ended to avoid illegal personnel getting access to the files.

Limitations

I must be honest, in any new idea, there must be certain limitations involved and some of the limitations encountered in the course of this research are:

- i. Testing – due to the technicality of this research, we would not test our model on current cloud servers to see how it would work and because of the sensitivity of information in cloud servers, and the fact that no one knows where organizations keep their cloud servers; we could not make necessary testing.
- ii. How will Mobile devices be able to auto—sync with the cloud servers involved if they have to log-in and authenticate before connecting.
- iii. If the files to be synchronized are large, there would be a huge delay in synchronizing the data after connection.

Future works

Due to the growing advancement in technology, Speed of connection is gradually being taken care of, as mobile devices are beginning to have LTE data technology, more work should be done on how fast it would take for data to be passed within the cloud, in such a way that the user is not burdened with waiting before file are being synchronized.

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Revitalising the Indian Economy through Entrepreneurial Mentoring

Dr.Ms. Sharayu Bhakare
Assistant Professor, Commerce
Symbiosis College of Arts and Commerce
Pune, Maharashtra, India
Contact: +91-9975892393
E-mail:sharau_csr@rediffmail.com

Dr.Mrs.Deepika Chadda
Associate Professor
Head of Department Accountancy
St.Mira's College
6 Koregaon Road
Pune,India
Contact: +91-97653-90522
E-mail: deepika.chadda@gmail.com

ABSTRACT

India is a nation where millions of young people are reaching working age every year. The Indian society youth scenario on the whole is greatly inclined towards a decent job or service as it gives immense economic security .This job oriented mind set is imbibed from childhood. Thinking of entrepreneurial activity as a future is challenging. Our educational s structure is also job oriented. A crucial requirement now is vocational training and artisans skills. Even a person with a high entrepreneurial propensity wanting to set up a business, is dejected by a host of unfavourable factors: want of information on setting up and operating a business, Bureaucratic hurdles, funds deficiency, lack of group and mentoring support, insufficient access to technology, operational hurdles , and the horrendous fear about the penalty and aftermath of failure. These factors appear largely as holding back the materialization of entrepreneurship. Due to these considerations, the Government of India has proposed a National Entrepreneurship Policy with the main aim to boost the supply of entrepreneurs. This paper endeavours to unfold the crucial role played by entrepreneurship mentoring to create a pool of entrepreneurs which would make the economy more balanced. It also tries to define how the entrepreneurial journey is traversed through mentors culminating in arriving at the destination of successful entrepreneurs. Through survey and case study methodology this paper highlights the impeding factors as well the benefits of entrepreneurial mentoring, emphasizing the need for it to be institutionalised in organised or unorganised manner and most certainly on a larger scale.

Key words: entrepreneurial mentoring, entrepreneurial skills, economic development.

INTRODUCTION

India is a nation where millions of young people are reaching working age every year. The Indian youth on the whole is greatly inclined towards a decent job or service as it gives immense economic security .This job oriented mind set is imbibed from childhood. Thinking of entrepreneurial activity as a future is challenging. Our educational s structure is also job oriented. A crucial requirement now is vocational training and artisans skills.

Even a person with a high entrepreneurial propensity wanting to set up a business, is dejected by a host of unfavourable factors: want of information on setting up and operating a business, Bureaucratic hurdles, funds

deficiency, lack of group and mentoring support, insufficient access to technology, operational hurdles, and the horrendous fear about the penalty and aftermath of failure. These factors appear largely as holding back the materialization of entrepreneurship. Due to these considerations, the Government of India has proposed a National Entrepreneurship Policy with the main aim to boost the supply of entrepreneurs.

This paper endeavours to unfold the crucial role played by entrepreneurship mentoring to create a pool of entrepreneurs which would make the economy more balanced. It also tries to define how the entrepreneurial journey is traversed through mentors culminating in arriving at the destination of successful entrepreneurs. Through survey and case study methodology this paper highlights the impeding factors as well the benefits of entrepreneurial mentoring, emphasizing the need for it to be institutionalised in organised or unorganised manner and most certainly on a larger scale.

The researchers intended to explore the inclination of the youth in this facet. The population chosen to administer the questionnaire was in the age group of 18-24 years. 18 years being the acceptable age being declared a responsible adult. 24 years being commencement of earning.

A study conducted amongst 200 student youth on the impeding factors in becoming entrepreneurs inferred the following findings. Out of the entire sample population, in response to the following aspects the results collated were as follows:

1. Only 20p.c. wanted to be potential entrepreneurs, the remaining revealed that their allegiance to a job oriented future.
2. The parameter deployed towards constraining these students from becoming potential entrepreneurs were lack of mentoring and the fear of failure. The other deterrents were, being first generation entrepreneurs, non acceptance by kith and kin towards the proposal of starting ones own enterprise, gauging risk outlay and its spread in varied aspects.
3. The student youth were further questioned on what would be the greatest factor in motivating /inclining them towards becoming potential entrepreneurs? The revealed that proper guidance could facilitate them in swerving towards going in for entrepreneurship as a career option.
4. When questioned about the general awareness of mentorship in this sphere they showed a general level of ignorance.
5. When questioned about institutional support available for the same there was absolute ignorance.

It is observed that a youngster with high entrepreneurial aptitude is wanting to set up a business but is discouraged by a host of adverse factors such as- lack of adequate access to information on setting and operating networks, difficult access to technology, lack of supportive systems, operational difficulties, risk failures and lack of proper guidance.

This pilot study revealed to the researchers that if the youth had to emerge as potential entrepreneurs a lot of hand holding is necessary. This could be done through mentors and the allied process of mentoring which would give proper continuous guidance.

REVIEW OF EARLIER STUDIES

The **National Knowledge Commission (NKC) India Report 2008** findings reveal that 95% of the entrepreneurs feel that entrepreneurship education is important. But 50p.c of the entrepreneurs experienced difficulties while seeking **statutory clearances and licences**.

The Entrepreneurship Policy Draft 2013 of Government study points out that- 81% of respondents who did not plan to take up entrepreneurship as a immediate career option were however willing to reconsider their career choice in favour of entrepreneurship if adequate counselling and guidance was given.

The previous studies in the literature also indicate a link between education and entrepreneurship (Galloway and Brown, 2002; Gorman and Hanlon, 1997; Henderson and Robertson, 2000; Kolvereid and Moen, 1997). Therefore,

getting an adequate education may foster entrepreneurial intention of a person. According to Garavan and O’Cinneide (1994, p. 3), “. . .there is clearly a major role and need for entrepreneurship education and training”.

Krueger, 2007, 2009-Mentoring has been suggested as the critical ingredient in evolving the entrepreneur’s business model while correspondingly evolving the entrepreneur’s cognitive development towards a more expert entrepreneurial mind (Krueger, 2007, 2009; Krueger et al., 2007).

According to Dr. **Jean Rhodes, professor of psychology at the University of Massachusetts, Boston**, the most significant predictor of positive mentoring results is whether mentors and mentees share a close, trusting relationship. Such relationships have to be nurtured. (Source: *Mentor/National Mentoring Partnership*; www.mentoring.org)

FACETS OF ENTREPRENEURSHIP MENTORING

Mentors should have skills in strategic thinking, human resource management, communications and finance besides genuine enthusiasm, active listening, openness, consistency, flexibility and clear focus.

Mentoring the youth aspiring to be entrepreneurs can help them in overcoming the fear of risk in starting an enterprise, inform them about the complex government formalities and financial aspects, give them clarity about the business environment, increase their confidence, self-efficacy and keep their spirits elevated.

Entrepreneurship mentoring can be facilitated in various ways on academic campuses. One important way is to associate with organisations which provide mentoring.

In order to gauge the **outreach of Mentoring in India**, the researchers interviewed five mentors/institutions in the state of Maharashtra and recorded their observations.

1. Mentoring was not structured it differed on a case to case basis
2. Mentoring was done in two ways.
 - a. For business purpose by professionals/institutions and
 - b. As a hobby by individuals
3. Extent of mentoring differs stage wise. E.g. initially a motivator to a strategist to a financier to a partner.(diag:1)



Figure 2:stages of mentor engagement

4. Mentoring prospers with networking facilitation
5. Mentoring happens for two sets of mentees..1. Gen Next who are net savvy 1. Net ignorant.

Some Organisations facilitating entrepreneurship mentoring in India and in Pune (Maharashtra)

Bharatiya Yuva Shakti Trust(BYST) is a non government organisation that is actively involved in mentoring new entrepreneurs. The trust aims at promoting young entrepreneurs from the underprivileged section of the society by helping them in setting up business. It provides them some initial financial assistance and business advice. Several

women and youth have started business with help of assistance given by BYST in the form of finance and guidance. They have become successful because of the mentoring done by the BYST mentors.

National Entrepreneurship Network: It provides critical support to start-ups and early-stage entrepreneurs through high-impact entrepreneurship education; access to mentors and experts; fast-track access to incubation and funding; and learning tools and materials. It partners with over 470 top-tier academic institutes in India to help them develop vibrant entrepreneurship ecosystems on campus, which develop and support new and future entrepreneurs.

The Indus Entrepreneurship (TIE): The members of TIE mentor and assist budding entrepreneurs and help in entrepreneurial issues such as business planning, fund raising, etc. They provide one-on-one mentoring opportunities to the individuals who aspire to be entrepreneurs.

Dasra Social Impact: Located in Mumbai works intensively in social entrepreneurship mentoring .It invites individuals with expertise to help the budding entrepreneurs to realize their visions and bring in social impact.

Indian Angel Investor Network: the Indian Angel Network is a unique concept which brings together highly successful entrepreneurs and CEOs from India and around the world who are interested in investing in start up / early stage ventures which have the potential of creating disproportionate value.The Network, in addition to money, provides constant access to high quality mentoring, vast networks and inputs on strategy as well as execution. The Network members, because of their background are better able to assess the potential and risks at the early stage. (www.indianangelnetwork.com).

Entrepreneurship Development Institute-This organisation has institutionalised mentoring by establishing an incubation centre in the college campus.This Institute focus solely on entrepreneurship development and has contributed immensely in fostering entrepreneurial eco-system in India.

Maharashtra Centre for Entrepreneurship Development (MCED): It is a training institute in the core area of entrepreneurship development. It works as a facilitator and guide for the creation and cultivation of the entrepreneurial spirit and the concept of 'self-employment' in a nation that is largely driven by third party employment.

MITCON: A Pune based organisation engaged aggressively in entrepreneurship development. Through its large network of alumni entrepreneurs and experts, MITCON offers assistance in establishing incubation centres in colleges and thereby provides mentoring service.

10000startups is a NASSCOM initiative.The organisations helps the aspiring entrepreneurs in business concept validation,high quality mentoring,seed capital funding,shared services and resources and peer learning.

CII(Confederation of Indian Industries): The organisation is engaged aggressively in skill development.Entrepreneurial mentoring to the rural youth is one of its major objectives.

SIDBI (Small Industries Development Bank of India)To boost entrepreneurship and provide working capital to micro, small and medium enterprises , the Small Industries Development Bank of India (SIDBI) has reoriented its business model. It plans to set up credit facilitation centres India in collaboration with industrial associations. These will be one-stop shops for entrepreneurs wanting to set up new MSMEs.

Other local organisations actively engaged in mentoring youth in becoming entrepreneurs are:
SME join up;Pune Open Coffee Club ;I –weekend ;Head-start network;Talent Bridge

These are some prominent organisations which offer entrepreneurship mentoring and will also facilitate entrepreneurship mentoring in colleges/ institutes if they are convinced with the integrity of these institutions in creating entrepreneurs.

OBSERVATION AND SUGGESTIONS

Entrepreneurial mentoring is still in the nascent stage in India. There is lack of awareness about this concept.. There are insufficient mentoring organisations and not many experts who can mentor.

However, in the urban areas mentoring is gaining popularity but at a slow tempo. This mentoring happens principally personally and rarely online. It is observed that online mentoring has not gained momentum in India as it has in the western countries. Entrepreneurial mentoring on large scale is done voluntarily by individuals through NGOs. There is absence of institutionalisation and professionalization of this 'service model'.

In rural areas there is complete ignorance about the concept of entrepreneurship mentoring.

Entrepreneurship mentoring could be done

- by Corporates through their CSR department. Employees could volunteer to be facilitators for entrepreneurship mentoring
- by educational institutions through their e-cell or incubation centres.
- by industry and management associations where expertise is available.
- Proprietors of small and medium scale industries could also come forward to provide mentoring.

More Venture capitalist establishments can institutionalise entrepreneurship mentoring.

Government bodies such as Human resource department at the centre and municipality at the local level can also establish cells for encouraging youth to be entrepreneurs and exterminating their apprehension through formalised mentoring.

Online mentoring needs to be boosted, where there are net savvy individuals.

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AN EFFECTIVE MALICIOUS NODE DETECTION SCHEME FOR SECURING MOBILE AD HOC NETWORKS

Varun Rao, Department of Computer Science and Engineering, University of Bridgeport, Bridgeport, CT
varunrao@bridgeport.edu

Syed Rizvi, College of Information Sciences and Engineering, Pennsylvania State University, Altoona, PA
srizvi@psu.edu

ABSTRACT

Mobile ad hoc networks (MANETs) are not bounded to a standard architecture as compared to traditional wired networks. Though, it gives ad hoc networks an edge over wired networks, there are several security problems that need to be addressed. One such critical problem requires a constant monitoring of mobile nodes to ensure that they do not indulge in malicious activities. Once a regular mobile node turns into a malicious node, it can significantly degrade the overall network throughput of MANET by consuming the useful bandwidth for malicious activities. Also, such malicious behavior raises the security concerns in the MANETs by not forwarding the packets to the intended destinations. Therefore, minimizing the malicious nodes is critical to maintain a consistent network throughput as well as intact the security of MANET. Several intrusion-detection schemes have been designed to meet this requirement. One such scheme consists of a watchdog and a path-rater. This algorithm works in two parts: intrusion detection, which is performed by the watchdog, and the response procedures, which is performed by the path-rater. This scheme works effectively to minimize malicious behavior of mobile nodes. However, it does not produce the desired results in the presence of malicious overhearing nodes. In this paper, we propose a new scheme that helps in detecting malicious nodes that aim to divide the network, thereby helping to strengthen the watchdog and path-rater scheme.

INTRODUCTION

Mobile ad hoc networks (MANETs) are one of the most recent additions to the ever-expanding field of mobile and wireless technology. Their advantages over traditional wired networks and conventional wireless systems are numerous (Jafri, 2010). One of the principal advantages of MANETs over normal wireless systems is the mobility of the nodes present in the network (Shobha, 2012). A MANET consists of several wireless nodes that can independently move around within a designated space. Usually, PDAs, cell-phones and laptops are used as mobile nodes. In a typically wireless configuration, the wireless nodes cannot leave the coverage area, prescribed by the central base station. This acts as a hurdle to mobility. MANETs alleviate this hurdle by allowing nodes that are outside the coverage area, to communicate with each other via intermediate devices or nodes. This implies the nodes behave as terminals as well as routers. Thus, there is no need for a central base station.

One of the most important issues that need to be addressed in the context of ad hoc networks is the security of the network, as a whole. It is very easy for any node to become part of an ad hoc network. This can easily be accomplished by a node by sending out a broadcast message to all the other nodes present in its vicinity. Once the initial message is broadcasted, the node starts listening to the incoming messages from the other active nodes. In this manner, each node learns about the nodes surrounding it. By performing this simple activity, any node can join the network. Thus, the ease by which an ad hoc network functions makes security of mobile nodes a real challenge.

To address this critical problem, certain steps need to be taken to ensure that there are no misbehaving nodes present within the network. For instance, a security scheme is required which can monitor and report the activities of misbehaving nodes present in the network. A misbehaving node may be either selfish or malicious. A selfish node is one that drops packets which are not meant for it. It acts in such a manner so as to preserve its own energy and band-width. A malicious node, on the other hand, is one that may forward packets to an entity other than the intended recipient of the packet. This may also indicate that the node could be a compromised node. One way of preventing selfishness in a MANET is a detection and exclusion mechanism.

Problem Identification

One of the schemes for detecting malicious nodes is 'watchdog and a path-rater' (Marti, 2000). It works in two phases. In the first phase, the watchdog, which is implemented on every node in the network, snoops on the transmissions of the next node. If it finds that for some reason, the neighboring node does not forward a packet not intended for it, to the next node in the chain, it informs the source node about this node. The source node then, lowers the rating of this node. In the same manner, the path-rater is also implemented on every node. The path-rater tries to find an alternate path from the source to the destination, which has minimum or no malicious nodes in it.

Both these phases are implemented on every node of the network. In an ad hoc network, when a node *A* (source) forwards a packet to another node *B*, the watchdog present on the source node *A*, checks the transmissions of node *B* to make sure that the packet is forwarded to the next node in the chain. The path-rater makes use of the data collected by the watchdog, to search for a new path having a minimum number of malicious nodes. Nevertheless, if the overhearing node is itself malicious, then this scheme does not produce the desired results. In this paper, we propose an algorithm that helps in detecting malicious nodes that aim to divide the network, thereby strengthen the original watchdog and path-rater schemes. For the purpose of detecting malicious nodes in an ad hoc network, we propose a scheme which minimizes the inadequacies of the traditional watchdog path-rater scheme. In this scheme, each node keeps track of the packets that it may forward, send or receive. Whenever, a source node receives complain about any node, it checks the sum of the number of packets that are received at the destination node. Only if the sum of packets at the two ends is equal, the source node is convinced that the node is really a malicious node. It then, decreases the rating of this node and tries to avoid this node on all paths to the destination.

RELATED WORK

Due to the limited strength of the radio transceivers present in ad hoc networks, a packet may need to traverse various nodes before it arrives at the intended destination node. Thus, the path through which the packet needs to be routed must be pre-determined by the nodes in the network. This function is performed by a routing protocol. Dynamic source routing (DSR) protocol (David, 2003) is used by the watchdog and path-rater scheme. DSR is a reactive routing protocol which finds the route to the destination only when requested by the source node. At other times, the network remains silent. In DSR, a path to the destination is found by flooding the network with Route-Request packets. There are two phases in DSR: Route Discovery and Route Maintenance (Jafri, 2010). When a source node needs to send a packet to the destination, it checks against its routing table to determine whether a route exists to the destination. If there is no existing route, a route discovery is launched. Route maintenance is used to check for broken or damaged links. If any such link is found, the source node is informed about it. Every entry containing this link in the routing table is removed and a new route discovery is then launched.

Some techniques make use of public key cryptography (Ghosh, 2009) for detecting malicious nodes. One of the most common types of attacks on reactive routing protocols in ad hoc networks is route falsification (Su, 2007). In such an attack, a malicious node tries to falsify broadcasts for route request and/or route reply packets to a destination. This causes an unusually high amount of data packets to flow through this route (Nicole, 2008). If a source node selects this route for forwarding data to the destination, the malicious node drops packets or forwards the packets after retrieving certain information that may compromise the entire network. The paper describes, watchdog and path-rater scheme to be implemented on every node in the network. The scheme works in two stages. When a node *A* forwards a packet to its neighbor node *B*, its watchdog snoops on the transmissions of the neighboring node. If it finds that the neighboring node does not forward the packet, even though it is not the intended recipient, it informs the source node about node *B*. The source node then decreases the rating for node *B*. In this way a rating is generated for every node, depending on its behavior. The path-rater then uses the data collected by the watchdog to find a path to the destination such that there are less or no malicious nodes on this path. The concept of the path-rater is similar to the Route guard (Hasswa, 2005).

PROPOSED SCHEME FOR MALICIOUS NODES DETECTION

The watchdog scheme (Marti, 2000) aims to detect malicious nodes by snooping on the transmissions of neighboring nodes. The information provided by the watchdog, is then used by the path-rater to assign a metric for each node depending on its behavior. In Fig. 1, node *S* represents the source node whereas *D* represents the destination node. *A* and *B* are the two nodes that lie down on the path from the source to the destination. Node *A* could falsely report node *B* to be malicious as it does not forward the packets, even if this is not true. This causes *S* to mark node *B* as malicious even though node *A* actually behaves as a malicious node.

Similarly, node *B* detects that node *A* drops acknowledgements to *S*, and reports this to the destination node *D*. The destination node *D* thereby, marks node *A* as malicious. This causes a split in the network as shown in Fig. 1. In this section, we propose an extension that aims to reduce the shortcomings of the standard watchdog. Watchdog is unable to detect a malicious node that tries to divide the network into two or more sections. From Fig. 2, it is seen that there are two paths from the source node *S* to the destination node *D*. The paths from source to destination can be shown as follows: $S \rightarrow A \rightarrow B \rightarrow D$ and $S \rightarrow A \rightarrow F \rightarrow D$

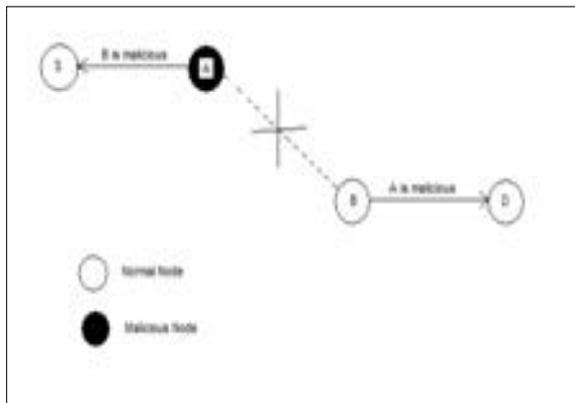


Figure1. Node *A* falsely reports node *B* as malicious

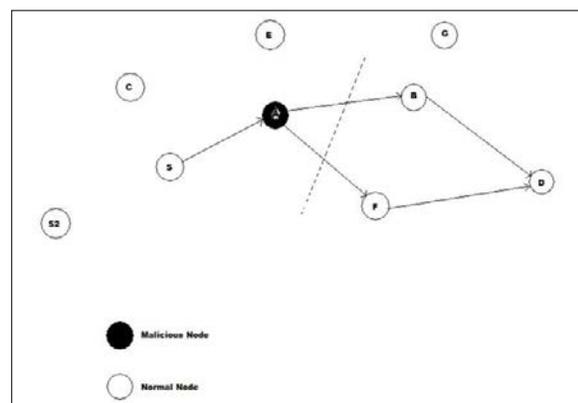


Figure2. Malicious node dividing the network

We consider a worst-case scenario where the malicious node *A* is on all paths from the source to the destination nodes. Node *A* reports nodes *B* and *F* to be malicious. Thus, the source node *S* marks *B* and *F* as malicious nodes and drops their ratings by a certain magnitude. Similarly, nodes *D*, *B* and *F* will also mark node *A* as malicious because node *A* drops the acknowledgements, intended for the source node *S*. If there are any other nodes that communicate with node *D* through node *S*, they are also informed about nodes *B* and *F*. These nodes also, mark *B* and *F* as malicious. As a result, the network is divided along the dotted line as shown in Fig. 2.

However, node *S* can still communicate with node *D* through a path that does not contain node *A*. Though, this communication comes at a high price for *S*. The source node *S* may have to search for a new alternate path to the destination node *D*. For this purpose, it launches a new route discovery. If a node such as *S2* launches a route discovery and *S* happens to be on the path to node *D*, node *S* does not return a route reply containing nodes *B* and *F*, even though this may be the optimal path to the destination node *D*. This increases the network overhead, and may drop the overall network throughput of the MANET. Another possibility is that the destination node *D* may inform *S* about node *A* being malicious. Thus, *S* may get confused as to which node is really malicious and which one is not.

Minimizing Malicious Nodes

The paper describes a technique that aims to strengthen the watchdog by detecting such nodes that attempt to partition the network by falsely accusing other nodes to be malicious. Such types of nodes cause much more damage to the network and must be detected as soon as possible.

In this technique, we make a few assumptions. The first assumption is that we make use of encryption mechanisms (Ghosh, 2009). At the same time, the key lengths are kept long so that they cannot be tampered with, by malicious nodes. The second assumption is that there always exists a path from the source to the destination that does not have any malicious nodes. Each node maintains a table that stores an entry $\langle source, destination, sum, path \rangle$. Every node makes an entry in the table when it forwards, sends or receives packets for the first time. The value of each field is as shown below:

- *source* – the address of the source node.
- *destination* – the address of the destination node.
- *sum* – the total number of packets the current node forwards, sends or receives using the route path.
- *path* – the route used for communication between the source and the destination.

If a node on a route to the destination detects that one of its neighboring nodes is malicious, it informs the source node about this. The source node does not lower the rating of this node immediately. It first sends a *check packet* to the destination node. This packet contains an entry $\langle source, destination, sum, node_address \rangle$ where source, destination and sum are the same as explained before. *node_address* is the location of the malicious node being reported. This packet is always sent along with an alternate path that has no malicious nodes, according to our assumption. If the source node cannot find such a route in its routing table, it launches a route discovery to find a new path and sends the message along with this path. When the destination receives this packet for the first time regarding a particular malicious node, it stores the packet in its table.

When the destination node receives the check packet from the source node for the second time, it searches its table for a match. If an entry is found, the destination compares the *sum* field present in the message, with the value present in its table. If both these entries match, it implies that the node forwards all packets sent by the node, indicating that it is not malicious. This further suggests that the node which made a false report in the first place is actually the malicious node. If the two sums are not equal, it implies that the node that is being reported is in fact the malicious node.

Algorithm for Detecting Malicious Nodes

We propose an algorithm that aims at detecting malicious nodes that try to split the network into two or more parts. Every node that forwards, sends or receives the packets must perform the following steps as shown in Fig. 3:

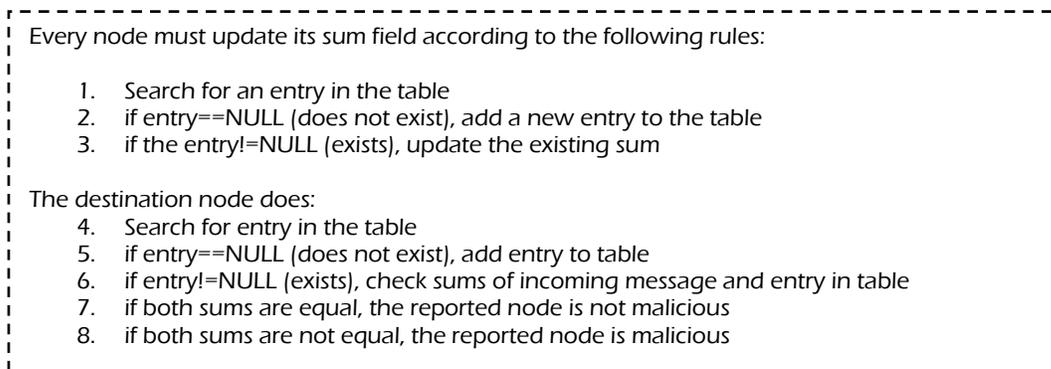


Figure3. Algorithm for detecting malicious nodes

IMPLEMENTATION OF THE PROPOSED SCHEME

The proposed algorithm shown in Fig 3 can be implemented with the help of the following graphical simulations. In Fig. 4, there exists a path from the source node S to the destination node D , via two nodes A and B . Of these nodes, B is a normal node while A is a node that tries to divide the network according to the scenario explained with the help of Fig. 1. Node A does not drop any packets. It only tries to frame other normal nodes by reporting them as malicious. At this stage, node S has not transmitted any packets. So the value of sum is zero for all the nodes. At a later stage, node S transmits three packets one after the other, that must arrive at the destination node D . We assume that there is only one path at present, for communication between the source and the destination nodes. The current path taken by the packets is described as: $S \rightarrow A \rightarrow B \rightarrow D$

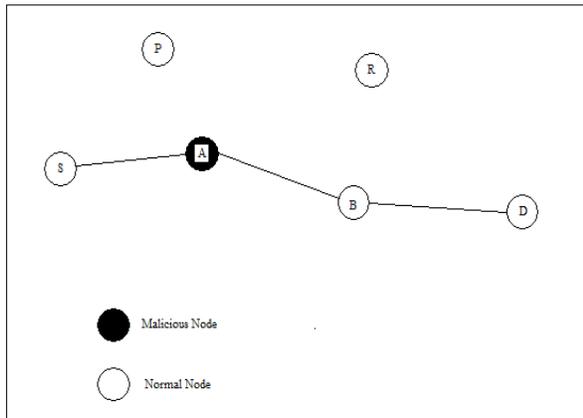


Figure4. Network scenario

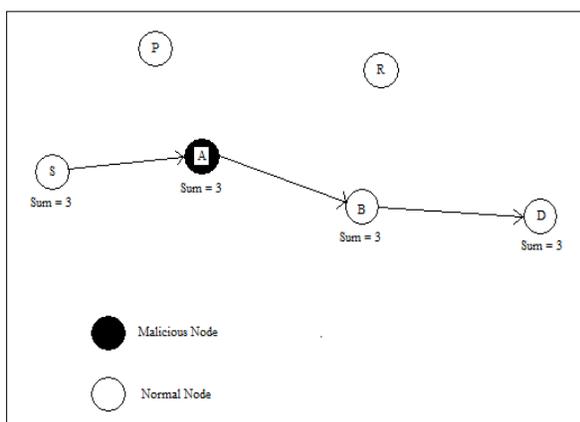


Figure5. The value of sum at every node

The values of the source node S , the destination node D and the path taken by the packets are stored in each node. The value of the sum field at each node is three, as shown in Fig. 5. At this point, since node A is a malicious node, it tries to divide the network at node B . For this purpose, it falsely reports node B as a malicious node. The

source node S, then creates a *check packet* with the following details as shown in Fig. 6. The check packet is then forwarded to the destination node D along with an alternate path that does not contain any malicious node as per our assumptions. The alternate path taken is defined as: $S \rightarrow P \rightarrow R \rightarrow D$

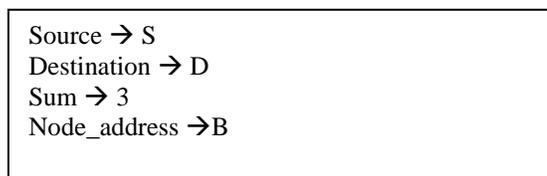


Figure6. The *check packet*

Since the check packet for node B arrives at the destination node for the first time, the destination node adds this entry in its table as shown in Fig. 7. The working of the network resumes as normal. The source node sends another packet towards the destination node along the same path $S \rightarrow A \rightarrow B \rightarrow D$. The *sum* field of each node is updated to four. At this instant, malicious node A once again reports node B to the source node. The same cycle repeats again. Node S creates a check packet with the value of the *sum* field updated to four and sends it to the destination using the same path taken by the previous check packet.

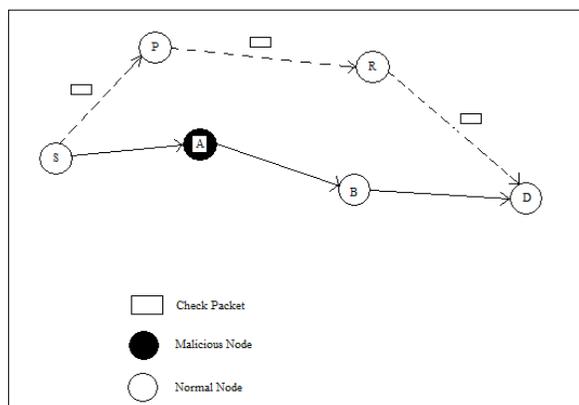


Figure7. Path taken by the check packet

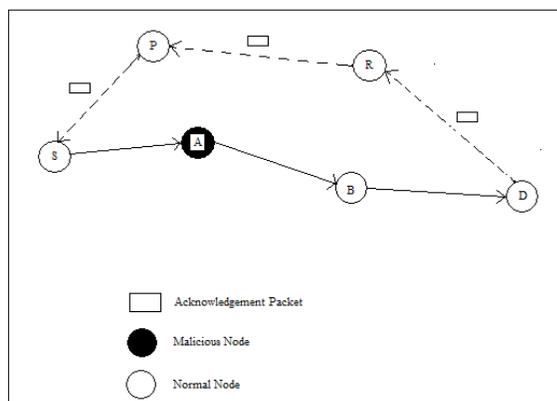


Figure8. Path taken by the Acknowledgement Packet

When the check packet arrives at the destination node D, the contents of the packet are observed. Since the destination had already received a packet reporting node B, it checks the contents of the *sum* field. Since B is not a malicious node, it has always been forwarding every packet without misbehaving in any way. Thus, the *sum* field of the destination node and the *sum* field in the received packet would both be equal to four. This tells the destination that the node which is being reported as malicious is not a malicious node at all. This also implies that node A which accuses B of misbehaving, is in fact, a malicious node. Thus, the destination node then sends an acknowledgement packet to the source node stating that node A is a malicious node. The path taken by the acknowledgement packet is as shown in Fig. 8. In this manner, the source node learns that node A is actually a malicious node and lowers its rating. This information is then used later by the path-rater in the second phase to find a path to the destination that has zero or minimum number of malicious nodes.

CONCLUSION

The intrusion-detection scheme proposed in this paper retains the original advantages of the traditional watchdog and path-rater scheme. However, it overcomes a major drawback of the traditional scheme, which is, detection of

nodes that try to divide the network. To support our proposed scheme, we also presented an algorithm for malicious node detection. We demonstrated that the proper implementation of the proposed scheme can effectively minimize the malicious nodes which in turns help improving the overall network throughput as well as intact the security of the MANET. In this paper, our main assumption is the existence of at least one path from the source to the destination that does not contain any malicious nodes. However, this assumption may not be true in practical environments. Thus, research into an even more practical approach, that eliminates the need for this assumption, is currently under way.

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Solar and Wind Powered Renewable Energy Strategies for Institutions and Organizations: A Case Study of University System of Maryland Institutions

Maurice Chike Ngwaba
Ayodele Julius Alade
University of Maryland Eastern Shore

Abstract: *Organizations and institutions are constantly seeking ways to improve effectiveness and efficiency in its processes especially in the procurement of renewable energy. This paper examined strategies that are being used by higher educational institutions to procure solar and wind powered renewable energy in the State of Maryland. The University System of Maryland and its eleven institutions were examined and it was found that the solar powered renewable energy strategies were driven by regulatory mandates, institutional objectives, environmental factors, technology, and the procurement environment.*

Introduction:

Institutions and organizations are constantly looking for ways to improve their business processes aimed at reducing operational costs, reduce greenhouse case emissions, and improve the environment. Renewable energy has been defined by Random House dictionary as “ any naturally occurring, theoretically inexhaustible source of energy as biomass, solar, wind, tidal wave, and hydroelectric power that is not derived from fossil fuel or nuclear” (Random House, 2013). With increased education on climate change and the efforts to continue to improve the quality of environment, the use of renewable energy has continued to gain ground in the U.S and among institutions and organizations. Recent study shows that the consumption of renewable energy in the US has increased from 6.04 quadrillion Btu in 1990 to 8.08 quadrillion in 2010 (U.S Census Bureau, 2012). The generation and of use of renewable energy such as wind and solar and biomass are projected to have increased from approximately 50 gigawatts in 2010 to nearly 120 gigawatts in 2035 (EIA, 2012). Though, according to the EIA, wind power dominates the renewable energy capacity growth, solar and biomass, however, continue to gain high market share. Wind generation capacity in U.S is expected to grow from 55 gigawatts in 2010 to 70 gigawatts in 2035. According to the EIA, consumption of renewable sources in the U.S totaled about 9 quadrillion Btu – or about 9% of all energy used nationally in 2011. About 35% of U.S electricity was generated from renewable sources in 2011. As governments continue to look for alternative sources of clean energy, investment in the use of renewable energy is said to be both encouraged and required by a range of State and Federal government’s incentives and legislations. With increased cost of energy coupled with interests to reduce greenhouse gas emissions, institutions and organizations are focusing on strengthening the generation and use of solar and wind renewable energy.

Literature Review

According to the Center for Sustainability (2012), public policy initiatives addressing alternative energy and the engagement of the industrial, residential, and commercial sectors have advanced the use of renewable energy. The supportive public policy programs include: Renewable Portfolio Standards that mandate certain levels of renewable power use in organizations. Incentives for renewable energy at Federal and State levels vary by means of technology employed, by production tax credits, grants and based on the way each government structures the incentives. The elimination of subsidies for fossil and nuclear energy may also advance renewable energy use as this may spur growth on alternative energy investment portfolio. Net metering programs which allow customers to sell back to utilities surplus renewable energy generated for the public use also serves as a vital incentive program. Renewable Energy Certificates (RECs) are also sold by green energy producers. Organizations and institutions can buy them to offset their usage of fossil fuel generated power. According to EPA (2013), Renewable energy certificates (REC) “represents the property rights to environmental, social, and other non-power qualities of renewable electricity generation...and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation”. In the same way, renewable energy certificates provide buyers the flexibility in procuring green power across a diverse geographical area and in applying the renewable attributes to the electricity use at a facility of choice – thus giving organizations the

opportunity to support renewable energy development and protect the environment without developing such energy locally. The sale of RECs helps renewable energy development and drive market competitiveness.

The University System of Maryland Institutions are signatories to the American College & University Presidents' Climate Commitment (ACUPCC). This organization plays a very visible and durable role in addressing climate change through the elimination of greenhouse gas emissions in their campus operations. The leadership of this organization developed a framework that will assist institutions to develop social, economic, and technological solutions to reverse global warming. According to ACCUPCC, the institutions are committed to complete a campus wide greenhouse gas emissions inventory, and within two years set a target date and milestones for becoming climate neutral. Also, the institution will have a net zero carbon emission, take immediate steps to reduce greenhouse gas emissions, integrate sustainability into curriculum or part of an educational experience and develop and make publicly available; the institutions climate action plan, emission inventory and progress reports. In an effort to keep up with commitment to ACUPCC, institutions have become engaged in energy Renewable projects and are consuming more green energy directly through the purchase of RECs.

The Chancellor of the University System of Maryland (USM) has mandated that System institutions comply with the ACUPCC and the State of Maryland greenhouse gas emission reduction standards. The State of Maryland has mandates for organizations and institutions in the State to reduce greenhouse gas emission and targets have been set. These regulatory mandates have a positive effect driving institution strategies for renewable energy use and generation.

Methodology: The University System of Maryland and its eleven institutions and public information on sustainability and climate change were reviewed. Individual campus renewable energy and sustainability web sites and public information reported to the American President's Climate Commitment.org by each institution were reviewed.

Findings:

Regulatory Mandates

Many institutions and organizations are looking for ways to provide cost effective solar and wind renewable sources and programs on the campuses. The strategies used in providing renewable energy resources and services vary from one organization to another. A review of the of the University System of Maryland Institutions shows that regulatory mandates affected solar and wind renewable energy strategies.

The University System of Maryland Institutions' are signatories to the American College & University Presidents' Climate Commitment (ACUPCC). Signatories to the ACUPCC are mandated to develop Climate Action Plans (CAP) and the plans set immediate, short term, intermediate and long term greenhouse gas emission reduction targets which is intended to ultimately lead to a zero or carbon neutral campus. The University of Maryland Eastern Shore (UMES) which produced 30,053.2 metric tonnes of carbon dioxide equivalent (MT-CO₂e) in 2008 set targets of 12% reduction for 2015, 25% reduction for 2025, with a 50% reduction in 2030 and a 100% reduction in 2050 (UMES, 2011). The State of Maryland Greenhouse Gas Reduction Act of 2009 did set targets of reducing greenhouse gas by 25% in 2020 and by 90% by 2050. The University System of Maryland institutions engage in renewable energy strategies to reduce greenhouse gas emissions and purchases RECs to offset carbon emissions.

Institutional and Organizational objectives

Institutional and organizational objectives assist in determining desirable solar and wind renewable energy strategy. The University of Maryland Eastern Shore (UMES) pursued a strategy of land use resource management and a long term predictable energy cost pricing. In a public private partnership (PPP) venture, SunEdison developed a 2.2 megawatts solar farm on a 17 acre site at the UMES campus site. Through a power purchase agreement (PPA), UMES will consume all green power generated at the site within twenty year period. Current data from the UMES Solar Web indicates that the solar farm is producing over 3,000 megawatt hours of green energy annually.

The University of Maryland, College Park (UMCP) has a student approved “Green Fee” program that is used to purchase 66 million Kilowatts hours of clean wind power. The green fee refers to student’s fees for sustainability or an increase in students’ fees to fund the installation of renewable energy technologies on campus. The Association for the Advancement of Sustainability in Higher Education (ASHE) has a list of institutions with such fee increases and the fee ranges from \$3 to 40 per term. In addition, UMCP in its sustainability strategy installed more than 2,600 solar panels at its project called the Severn Solar Array. In its infrastructure development strategy, it installed 20 solar hot water panels providing 30% of the buildings hot water. The Cole Field house is said to have photovoltaic (PV) solar array that provides 5.25KW of energy to the building.

University System of Maryland (USM) and the State of Maryland Department of General Services (DGS) engaged in a power purchase contracts for renewable energy. In this contract, the organizations purchased 16 megawatts solar powered green energy at Mount St. Mary’s University, 10 megawatts wind project at Western Maryland, and 55 megawatts wind energy in West Virginia. These lump sum renewable energy contracts are paid for through a campus consumption share program by the USM institutions as part of the initiative to support green energy use and technology. The renewable energy certificates (RECs) are also retained by the participating institutions.

Frostburg University intensity on renewable energy research has earned it commendation and awards from the Second Nature, an organization dedicated to Education for Sustainability. As noted in the citation by Second Nature (2013):

“Frostburg University (FSU) is positioning itself to become a national leader in renewable energy through the construction of its Sustainable Energy Research Facility (SERF). Designed to be completely off grid and slated for completion in 2012. SERF will house the FSU Renewable Energy Center, where Frostburg’s faculty, students and their project partners can develop and conduct research on renewable energy applications and provide education and community outreach programs to homeowners, farmers and entrepreneurs interested in harvesting renewable energy sources and energy security”.

Frostburg State University Renewable Energy Center organizes and presents workshops on wind and solar energy that provides education experiences leading to certifications, as well as engages in constructing buildings that are solar and wind energy powered and that are off the grid. This positions Frostburg State University as one of the leading institutions in constructing non fossil fuel energy independent buildings.

Environmental Factors

It can be observed that the geographical location of an institution plays a key role in its strategy for solar and wind renewable energy. Rural area and semi urban areas located institutions can easily accommodate ground based solar or even wind based renewable energy strategy. Urban campus on the other hand appear to be limited in their application of solar energy and may find it much harder incorporating wind energy except through power purchase agreements, independent renewable generators, or through public private partnerships.

The University of Maryland Eastern Shore located in Somerset County Maryland, enjoys over 745 acres of its own land and was able to easily dedicated 17 acres of land to its solar farm that generates 2.2 megawatts of green energy. The other urban campus such as University of Maryland College Park, University of Maryland Baltimore, and University of Baltimore are not so privileged to have such infrastructure on their campuses. On the other hand, such institutions may pursue limited strategies that may include a few solar panels for a dedicated green building or for demonstration or research on their campuses. Installing a wind turbine within an urban campus could be said to be next to impossible due to emerging and stringent regulations and codes.

A review of the University System of Maryland urban universities solar and wind renewable strategies indicates that these campuses are focusing more on renewable energy certificates (RECs) procurement and energy conservation strategies with selected utilities, and providers. University System of Maryland (USM) and State of Maryland Department of General Services power purchase contracts for Renewable energy that includes 16 megawatts of solar energy at Mount St. Mary’s University, 10 megawatts wind project at Western Maryland and 55 megawatts of wind energy from West Virginia further supports the view that these renewable energy locations

and institutions that are not urban and can easily accommodate the size of the wind and solar applications developed.

Each institutions type of building and structure both existing and planned will affect the strategy of the type of solar and wind renewable energy generated and used. A survey of institutions building and roof type was conducted in 2012 by the Office of Capital Planning at the University System of Maryland to ascertain the institutions that can accommodate “roof-top” based renewable energy projects. Whereas the result of the survey is not yet published, institutions with buildings with flat roofs, and majority south facing hip or gable roofs will likely have a higher chance of getting proposals from vendors for installation of solar powered renewable energy.

Capital Project Process.

The State of Maryland and the University System of Maryland Capital Projects Policy have mandated a minimum of Leadership in Environment and Energy Design (LEED) Silver Certification as a minimum for high performance buildings costing more than \$10 million. This requirement is forcing institutions to incorporate renewable energy and sustainability strategies to meet the minimum LEED Certification. Newer projects in the University System are getting LEED Gold and Platinum certifications.

Technology

Available technology in solar and wind renewable energy does impact on the strategies employed by the University of Maryland Institutions. The storage limitations of the solar energy capacities make it much more difficult for users to dedicate their facilities solely to solar or wind energy use. Unless technology advances where storage capacities can increase and solar powered standalone facilities are available or built, the strategy will always be for operational augmentative purposes to the fossil fuel consumption. To improve renewable energy performance in buildings, designers and users are incorporating hybrid renewable energy systems where solar can be combined with geothermal systems. For some projects at appropriate remote areas, wind, solar and geothermal systems are combined. Simply put, the solar energy alone will be used only as a helper in major projects developments. On the other hand, the wind technology has stringent environmental limitations that includes; locational wind patterns, proximity to communities and developments, reliability of production and so forth. Improvements in the solar and wind technologies will variously impact on the use of these renewable energy sources by each institution.

Procurement Environment

The renewable energy procurement environment has been an expensive one. The procurement environment is froth with incentives and tax credits and in some instances up to thirty percent of the cost of the renewable energy development. Investors are trading on the renewable energy certificates and the benefits include increases on renewable energy generation. The sizes of renewable energy generation sources in excess of 500 kilowatt hours in the University System of Maryland institutions seem to have been through a Power Purchase Agreement (PPA). The PPA agreements may or may not include renewable energy certificates (RECs). The institutions in the University System of Maryland are not for profit organizations and as such are barred from getting the 30% renewable energy credits for generation. However, they can purchase RECs to offset their fossil fuel use. If the higher educational non-profit organizations are allowed to get and use the tax credit incentives, such incentives would invariable help increase the rate of power generation in these institutions and organizations. Furthermore the economic downturn from 2008 to 2012 has affected capital improvement projects at the University System of Maryland institutions and the State of Maryland budget. The number of capital projects funded by the State of Maryland is lower when compared to actual requests by institutions in the last five years. Energy performance contracting seems to have gained much use in the intuitions due to the flexibility inherent in the use of dedicated utility operational funds.

Conclusion

Institutions are poised to continue solar and wind renewable energy production and use. The U.S Energy Information Administration renewable energy outlook for 2012 shows an industry on the rise. The industry is projected to have a renewable energy production growth of approximately 53 gigawatts in 2010, to approximately 120 gigawatts of green energy in 2035. The University System of Maryland and its institutions, committed to sustainability and reduction and ultimate elimination of the greenhouse gas emissions in its operations are focused

on enhancing solar and wind renewable energy use and generation. With commitment to greenhouse development, the University System of Maryland and its eleven institutions consider regulatory mandates, institutional objectives, environmental factors, technology, and the procurement environment in the development of their solar and wind powered Renewable energy strategies for their campuses.

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SYSTEM COST OPTIMIZATION IN MULTI-CLASS UTILITY COMPUTING SYSTEMS

Satish Penmatsa, University of Maryland Eastern Shore, USA, spenmatsa@umes.edu

ABSTRACT

Utility computing systems provide computing resources to the users which are often distributed and heterogeneous. The vendors of these utility computing systems provide resources to the users as needed and charges them for specific usage. In this paper, we study a load balancing scheme for multi-class utility computing systems with central-server model. The objective of the load balancing scheme is to minimize the cost for executing the jobs of all users in the system in order to provide a system-optimal solution. The prices that the users pay for using the resources are obtained using a bargaining game theory model. The performance of the load balancing scheme is evaluated using computer modeling with various system configurations.

1. INTRODUCTION

Utility computing is a business model in which the provider outsources its computing resources to the clients. Utility computing systems provide these computing services through an on-demand, pay-per-use billing method. The computing resources in these systems may be distributed and connected using communication networks. The computing and communication networks are often heterogeneous having various processing speeds and data transfer rates. Inefficient allocation of client (user) jobs to these resources may lead to severe performance degradation of the system. This can affect the completion time (response time) of the users jobs and the users may end up paying more price for the execution of their jobs.

In this paper, we study a load balancing scheme that balances the load in utility computing systems for improving its performance. The objective of the load balancing scheme is to minimize the cost for executing the jobs of all users in the system in order to provide a system-optimal solution. This reduces the price that the users have to pay for executing their jobs. A multi-class utility computing system with central-server node model is considered.

The prices that the users have to pay for using the utility system resources are obtained using a bargaining game theory model. The resources of utility computing systems may belong to various owners. In order to obtain the prices charged by the resource owners, we use a pricing model based on bargaining game theory proposed in Ghosh et al. (2005). The software agents of the user and the resource owner play an incomplete information, alternating-offer, non-cooperative bargaining game in order to obtain an agreed price-per-unit-resource. Both the players try to maximize their profits and so the game reduces to the case of dividing the difference of maximum buying price offered by the user and minimum selling price expected by the resource owner. Please see Ghosh et al. (2005) for a complete description of the pricing model.

Several studies exist on load balancing in distributed computing systems (Grosu et al. (2005), Kwok et al. (2007), Kameda et al. (1997), Penmatsa et al. (2011), Penmatsa et al. (2012), Subrata et al. (2008) and references therein). The objective of most of the previous schemes was to minimize the response time of the system or of the individual users. Load balancing for distributed systems with a central-server computer model was studied in Zhang et al. (1995). Job allocation in E-commerce systems involving multiple selfish agents with a central-server node model was studied in Penmatsa et al. (2010). The objective of the job allocation scheme was to improve the performance of the E-commerce system by minimizing the response time of users jobs and also provide fairness to all the users. Cost minimization in utility-driven distributed computing systems with central-server model was studied in Penmatsa et al. (Nov. 2010). In Penmatsa et al. (July 2010), a comparison of price-based static load balancing schemes for utility-driven distributed computing was made. In Penmatsa et al. (Nov. 2010) and

Penmatsa et al. (July 2010), only single-class (single-user) jobs were considered in the model. Cost minimization in utility computing systems using a computer model with a single processor was studied in Penmatsa et al. (2012).

2. SYSTEM AND NODE MODELS

A utility computing system model with n computers (or nodes) and m users (classes) connected by a communications network is considered. Each computer is modeled as a central-server model (Jain (1991) and Zhang et al. (1995)) as shown in Figure 1. p_0 denotes the probability that a job after departing from the processor finishes. p_1 denotes the probability that a job after departing from the processor requests I/O service. Therefore, p_1/p_0 denotes the average number of I/O requests per job. The terminology and assumptions used are similar to those described in Penmatsa et al. (2006) and Penmatsa et al. (2010).

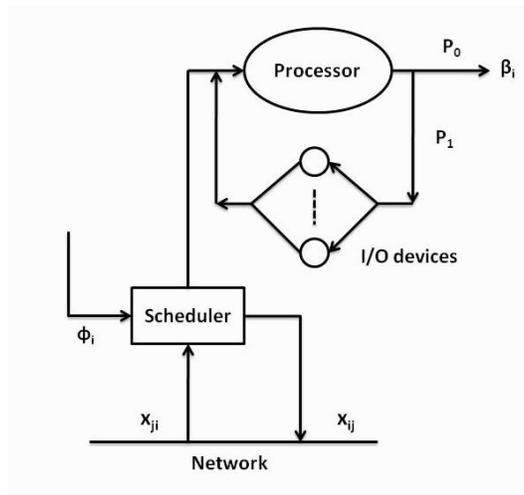


Figure 1: Node Model

- ϕ_i^j : Job arrival rate of user j to computer i .
- ϕ^j : Total job arrival rate of user j . So, $\phi^j = \sum_{i=1}^n \phi_i^j$.
- ϕ : Total job arrival rate of the system. So, $\phi = \sum_{j=1}^m \phi^j$.
- μ_i : Service rate of computer i .
- t_{IO} : Service time of an I/O device.
- β_i^j : Job processing rate (load) of user j at computer i .
- $\beta_i = [\beta_i^1, \beta_i^2, \dots, \beta_i^m]^T$; $\beta = [\beta_1, \beta_2, \dots, \beta_n]^T$; $\beta^k = [\beta_1^k, \beta_2^k, \dots, \beta_n^k]^T$

- x_{rs}^j : Job flow rate of user j from computer r to computer s .
- λ^j : Job traffic through the network of user j ($\lambda^j = \sum_{r=1}^n \sum_{s=1}^n x_{rs}^j$)
- $\lambda = [\lambda^1, \lambda^2, \dots, \lambda^m]^T$
- t : Mean communication time for sending and receiving a job form one computer to the other for any user.

We assume that k_i is a constant which maps the execution time to the amount of resources consumed at computer i and k_c is a constant which maps the communication delay to the amount of resources consumed from the communication network. p_i^j denotes the price per unit resource on computer i for user j . The price the users have to pay for consuming a unit resource of the network is a constant for all the users and is denoted by p_c .

3. LOAD BALANCING PROBLEM AND COST MINIMIZATION

Based on the above assumptions, the expected cost (or price) for a user j job processed at computer i is given by (Jain (1991)):

$$F_i^j(\beta_i) = \frac{k_i p_i^j}{(\mu_i - \sum_{k=1}^m \beta_i^k)} + \frac{p_1}{p_0} t_{IO} \quad (1)$$

The expected communication cost of a user j job is given by (Jain (1991)):

$$G^j(\lambda) = \frac{k_c p_c t}{(1 - t \sum_{k=1}^m \lambda^k)}, \sum_{k=1}^m \lambda^k < \frac{1}{t} \quad (2)$$

Thus, the problem of minimizing the expected cost of the entire system can be expressed as

$$D(\beta) = \frac{1}{\phi} \sum_{j=1}^m [\sum_{i=1}^n \beta_i^j F_i^j(\beta_i) + \lambda^j G^j(\lambda)] \quad (3)$$

subject to the constraints:

$$\beta_i^j \geq 0 \quad (4)$$

$$\sum_{i=1}^n \beta_i^j = \phi^j \quad (5)$$

The above non-linear optimization problem can be solved by using the Kuhn-Tucker theorem. The user j marginal computing cost $f_i^j(\beta_i)$ and marginal communication cost $g^j(\lambda)$ are defined as:

$$f_i^j(\beta_i) = \frac{\partial}{\partial \beta_i^j} \sum_{k=1}^m \beta_i^k F_i^k(\beta_i) = \frac{k_i p_i^j \mu_i}{(\mu_i - \sum_{k=1}^m \beta_i^k)^2} + \frac{p_1}{p_0} t_{IO} \quad (6)$$

$$g^j(\lambda) = \frac{\partial}{\partial \lambda^j} \sum_{k=1}^m \lambda^k G^k(\lambda) = \frac{k_c p_c t}{(1 - t \sum_{k=1}^m \lambda^k)^2} \quad (7)$$

For each user j , nodes are classified into the following as in Penmatsa et al. (2006): Idle source nodes (R_d^j), Active source nodes (R_a^j), Neutral nodes (N^j), and Sink nodes (S^j). The solution to the optimization problem in eq. (3) is given by the following theorem:

Theorem 1: The solution to the optimization problem in eq. (3) satisfies the relations

$$\begin{aligned} f_i^j(\beta_i) &\geq \alpha^j + g^j(\lambda), & \beta_i^j &= 0 & (i \in R_d^j), \\ f_i^j(\beta_i) &= \alpha^j + g^j(\lambda), & 0 < \beta_i^j < \phi_i^j & & (i \in R_a^j), \\ \alpha^j + g^j(\lambda) &\geq f_i^j(\beta_i) \geq \alpha^j, & \beta_i^j &= \phi_i^j & (i \in N^j), \\ f_i^j(\beta_i) &= \alpha^j, & \beta_i^j &> \phi_i^j & (i \in S^j) \end{aligned} \quad (8)$$

subject to the total flow constraint,

$$\sum_{i \in S^j} (f_i^j)^{-1}(\beta_i |_{\beta_i^j = \alpha^j}) + \sum_{i \in N^j} \phi_i^j + \sum_{i \in R_a^j} (f_i^j)^{-1}(\beta_i |_{\beta_i^j = \alpha^j + g^j(\lambda)}) = \phi^j \quad (9)$$

where α^j is the Lagrange multiplier.

Proof: The non-linear optimization problem can be solved using the Kuhn-Tucker theorem similar to Penmatsa et al. (2006).

In order to obtain the system optimal solution that minimizes the system cost, an algorithm (GOSPC-CS) similar to the Optimal Load Balancing Algorithm described in Kim et al. (1990) can be derived by replacing the F, G, D, f, and g functions given in Kim et al. (1990) by F, G, D, f, and g functions described above.

4. EXPERIMENTAL RESULTS

In order to evaluate the performance of the GOSPC-CS load balancing scheme a heterogeneous utility computing system with 16 computers is considered similar to Penmatsa et al. (2010). The system has computers with various processing speeds. Six computers have a service rate of 10 jobs/sec; five have a service rate of 20 jobs/sec; three have a service rate of 50 jobs/sec; and two have a service rate of 100 jobs/sec. The Proportional scheme (PROP) by Chow et al. (1979) that allocates the jobs in proportion to the processing speeds of the computers is used for comparison purposes.

The values for k_i , the constant which maps the execution time to the amount of resources consumed at computer i are chosen based on the service rates of computers similar to Ghosh et al. (2005). The prices p_i^j for each user are

obtained based on the alternating offer bargaining game described in Section 1. k_c , the constant which maps the communication delay to the amount of resources consumed from the communication network and p_c , the price the users have to pay for consuming a unit resource of the network are assumed to be 1.

Figure 2 presents the expected price or cost of the utility system for various system loads (system utilizations). It can be observed that the cost increases as the system load increases. The expected cost in the case of GOSPC-CS is considerably low compared to PROP. Figure 3 presents the expected cost of the utility system for various heterogeneous levels of the system. It can be observed that the cost decreases with an increase in heterogeneity. The expected cost in the case of GOSPC-CS is considerably low compared to PROP.

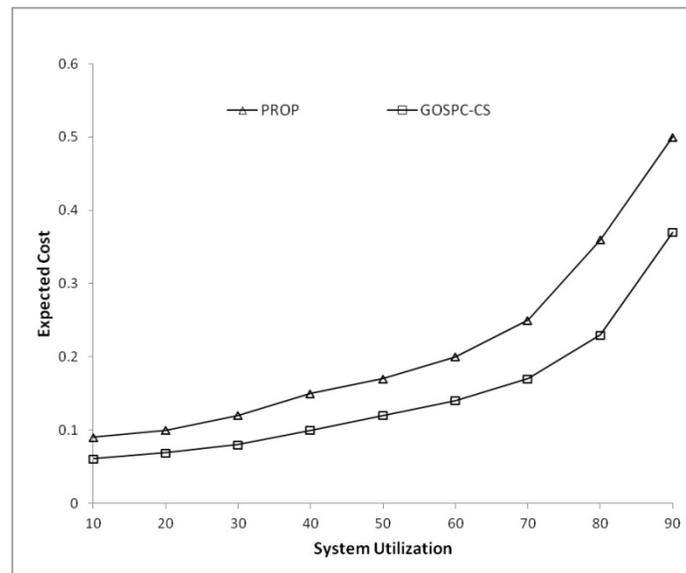


Figure 2: Expected Cost with variation of System Utilization

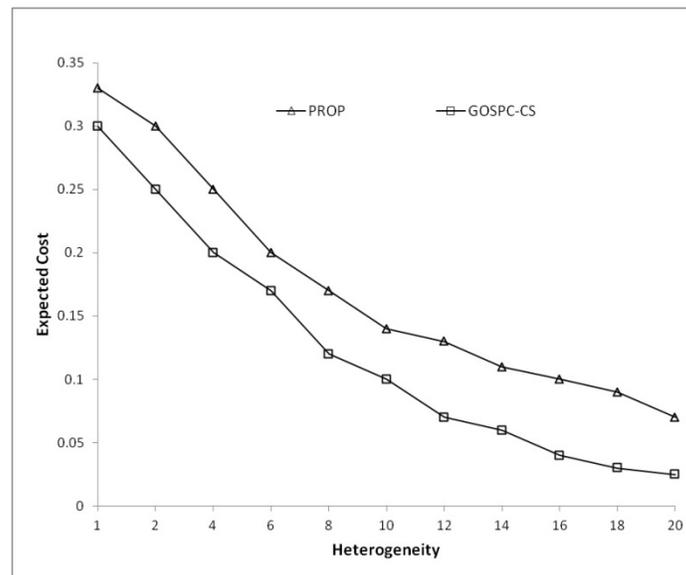


Figure 3: Expected Cost with variation of Heterogeneity

5. CONCLUSION

In this paper, we studied a GOSPC-CS load balancing scheme for multi-class utility computing systems with central-server model whose objective is to minimize the cost for executing the jobs of all users in the system in order to provide a system-optimal solution. The prices that the users pay for using the resources are obtained using a bargaining game theory model. Experimental results showed that the cost for using the system by the load balancing provided by GOSPC-CS is considerably low compared to the cost for using the system by the load balancing provided by PROP.

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THE DETERMINANT OF INDUSTRIAL RELATIONS IN GLOBALIZATION

Dr. Jitendra Kumar Sharma
Lecturer,
Department of Economic Administration & Financial Management
Sh. B.R. Mirdha Govt. (PG) College, Nagaur (Rajasthan), INDIA
E-mail: jk.kamlesh@vao.com

As in a civilized society relations among human beings determine the quality of society, industrial relations in an industrial organization vitally spell out the success or unsuccess of that organization. In fact, Industrial Relations generally imply the relationship between the management and the organized labor in an industrial organization or within an industry. In this fast developing world industrial progress is a synonym for material well being of a country. For this industrial relations are of utmost importance. It has been pointed out by few management experts like that Bethel, Atwater, Smith & Stackman state that industrial relation is that part of management which is concerned with the manpower of the enterprises(1). "Industrial Relations is an art, the art of living together for the purposes of productions"(2). The relationship can either be cordial or otherwise, depending upon the attitudes and approaches of the people concerned. Attitudes and approaches of the management and those of workers, possibly represented by trade unions, can be complex and diverse. Dunlop attests that the industrial societies necessarily create industrial relations defined as the complex of inter-relations among workers, managers and the government.(3) Thus, Industrial Relation is the composite result of the attitudes and approaches of the employers and employees towards each other with regard to planning, supervision, direction and coordination of the activities of an organization with a minimum of human efforts and frictions with an animating spirit of cooperation and with proper regard for the genuine well being of all members of the organization.(4)

Hence, Industrial Relation is the relation in the industry created by the diverse and complex attitudes and approaches of both the management and the workers or employers and employees in the connection with the management of the industry. The attitudes of both workers and management influence each other and determine natural relationship. However, it should be noted that industrial relation is not a simple mutual relationship. It is a set of functional inter dependence which is influenced by various factors, say, economic, social, psychological, technological, political occupational etc.

Importance of Cordial Industrial Relations in the Globalization

The healthy industrial relations are key to the progress and success. Their significance may be discussed in an era of Globalization as under –

Uninterrupted production – The most important benefit of industrial relations is that this ensures continuity of production. This means, continuous employment for all from manager to workers. The resources are fully utilized, resulting in the maximum possible production. There is uninterrupted flow of income for all. Smooth running of an industry is of vital importance for several other industries; to other industries if the products are intermediaries or inputs; to exporters if these are export goods; to consumers and workers, if these are goods of mass consumption.

Reduction in Industrial Disputes – Good industrial relations reduce the industrial disputes. Disputes are reflections of the failure of basic human urges or motivations to secure adequate satisfaction or expression which are fully cured by good industrial relations. Strikes, lockouts, go-slow tactics, gherao and grievances are some of the reflections of industrial unrest which do not spring up in an atmosphere of industrial peace. It helps promoting co-operation and increasing production.

High morale – Good industrial relations improve the morale of the employees. Employees work with great zeal with the feeling in mind that the interest of employer and employees is one and the same, i.e. to increase production. Every worker feels that he is a co-owner of the gains of industry. The employer in his turn must realize that the gains of industry are not for him alone but they should be shared equally and generously with his workers. In other words, complete unity of thought and action is the main achievement of industrial peace.

It increases the place of workers in the society and their ego is satisfied. It naturally affects production because mighty co-operative efforts alone can produce great results.

□ **Mental Revolution**– The main object of industrial relation is a complete mental revolution of workers and employees. The industrial peace lies ultimately in a transformed outlook on the part of both. It is the business of leadership in the ranks of workers, employees and Government to work out a new relationship in consonance with a spirit of true democracy. Both should think themselves as partners of the industry and the role of workers in such a partnership should be recognized. On the other hand, workers must recognize employer's authority. It will naturally have impact on production because they recognize the interest of each other.

□ **Reduced Wastage**– Good industrial relations are maintained on the basis of cooperation and recognition of each other. It will help increase production. Wastages of man, material and machines are reduced to the minimum and thus national interest is protected.

Thus, it is evident that good industrial relations is the basis of higher production with minimum cost and higher profits. It also results in increased efficiency of workers. New and new projects may be introduced for the welfare of the workers and to promote the morale of the people at work. An economy organized for planned production and distribution, aiming at the realization of social justice and welfare of the mass can function effectively only in an atmosphere of industrial peace. If the twin objectives of rapid national development and increased social justice are to be achieved in the Globalization era, there must be harmonious relationship between management and labor.

Labour Reforms' Pre- conditions

There is a strong clarion call from India's strongest and influential quarters– the CII on the need to update the labour laws in vogue. One of the chief reasons given for the need for labour reforms is that many of the labour laws are quite irrelevant and do not reflect the requirements of the day. It must be admitted that there is much substance in this argument. The Industrial Disputes Act, the Trade Unions Act, among many others was authored in a time period when concepts like liberalization, globalization or privatization were not even fully understood, let alone practiced. A casual glance at the years in which these legislations came into existence, makes one wonder why there has been a complete neglect in updating these important legislations. True, there have been some attempts to bolster up the weaker sections of these legislations by various amendments from time to time. But, that cannot be construed as good enough. Before going on to the issue of Labour reforms, one has to take stock of the recent developments in the industrial world. The developments are truly stupendous and mind boggling. Technology, business models, the size of business, the complexities of a global market, governmental requirements, the society as a stake holder are all challenges the modern industry has to contend with. Therefore, there is much justification on the part of the industry leaders asking for "legitimate space" to operate. All systems that need to be developed and put in place have got to be done without any further delay. Definitely, labour reforms is one issue that needs urgent attention. As we discuss this issue, comes in the news that in 2050 India will overtake Developed Nations. 2050 is not really that far off and the question is - are we prepared for this quantum leap? It is now sufficiently established that there is a legitimate need for all round reforms – especially in the area of labour reforms. But, one has to proceed with caution in understanding what impact these labour reforms are expected to have. There is an unfortunate tendency to copy anything western, especially American when it comes to labour management. In business schools, young managers are briefed about the 'bold' move of AT&T in terminating the services of employees by the thousands, on one single day. What is conveniently forgotten is that 'May Day' and the accompanying legitimacy for worker rights came from these countries. It is also unfortunately forgotten that these countries have more stringent labour laws than many socialist countries – case in point, the minimum wages that are in vogue, the social security systems in place, etc. The more glaring mistake is in not understanding the differences in socio economic conditions that prevail in India and the other 'model countries'. If today, the developed countries have given their industry leaders so much space, it is after having ensured that the social fabric is strong enough to support the vagaries, uncertainties and imponderables of development. By no stretch of imagination can we term India ready for these sweeping changes. Every step forward will have to factor in the unique conditions

that prevail in this vastly diverse and complex country. There is no need to go into the micro details of the labour reforms. What, however, is required is a detailed discussion on the impact of the intended labour reforms and then decide on what reforms are appropriate for our economy. Agreed, we need reforms. But every reform should make the playing field more even for all the players. Lame and unsustainable arguments of profits, economics or sustainability cannot justify fleecing the labour force. There are enough case studies to prove the death of organizations is more due to poor management rather than labour unrest. The only litmus test needed to accept the merit of the intended reforms is - does it compromise on the welfare of employees? The resultant answer would determine the need for such reforms. There is already a great share of controversies that need to be resolved before deciding on adding a few more to the inglorious list. Take for example; the ILO recognizes the right of employees to organize themselves and to even strike work. The way forward could be by judiciously adopting the following steps:

1. **Change in perception:** that is the immediate requirement of the day. Of course, the first initiative has to come from the industry. Talking to HR managers across the country, one is amazed at the rigid picture that they have etched in their minds about the role of trade unions and unionists. True, there is a lot of sense and truth in their argument. But that is the challenge! Doing away with trade unions is not the answer, because that would go against natural justice. Even if one can imagine, a situation where there are no trade unions and no protective legislations, can we let the fate of an entire labour force hang on the fickle thread of hope that the industry would treat its employees fairly? What is the guarantee that this system of implicit and explicit faith would not be mismanaged by the industry? Enron, Union Carbide, etc are names and images that cannot be conjured away easily. What is sauce for the goose is necessarily sauce for the gander. The change in mindset has to come in terms of extending the trust radius to include employees in the main stream activities of the organization and simultaneously, engaging in serious confidence building measures like promoting transparency, equity and a sense of fair play.

2. **Educate the workforce:** Having acknowledged the workforce as equal partners, it is imperative that they be educated on the emerging requirements of coexistence. A quick look at the emerging software and IT industry reveals the low level of unionization present there. The education did not take place inside a class room; rather it is seen in the tangible benefits enjoyed by the knowledge worker. However, different methods need to be adopted for different industries and workforces.

3. **Float the idea:** The idea of reforms can mean different things to different people. The industry, simply for the reason it initiated this debate, will have to clarify what it expects from these reforms. It has to necessarily spell out the positive and negative outcomes that the workforce can expect from these intended reforms.

4. **Invest in the future:** the journey is going to be long and hard. Labour Reforms is not an easy task. The first 'go ahead' has to come from the labour force itself. Convincing them of the need for reforms is the first step. Gaining their confidence and acceptance comes gradually and in small increments (considering the less than conducive relationship prevailing). Initial failures should not derail the process. Much needs to be invested in terms of goodwill gestures, tangible benefits, safety networks, etc before any significant improvements can be expected. Until then, patience and perseverance should be the guiding principles.

To conclude, every reform envisioned should aim at inclusive growth. That is the need of the hour for a resurgent and resilient Indian economy. We have enough examples to learn from around the world on how such inclusive growth can be ensured. Let us take up the right models.

The Determinant of Industrial Relations

It is true that industrial relations can perform a number of functions and their scope and effects can be wide spreads and far reaching. Good industrial relations, not only maintain cordial atmosphere in the industry, but also facilitate production and industrial growth. They also safeguard the rights of the workers and the prestige and interest of the management. The three parties who are primarily concerned with industrial relations and whose interaction will determine the shape of industrial relations are the employers of the management, the workmen and their trade unions and the Government. Good labor- management relations depend on employers and trade unions being able to deal with their mutual problems freely, independently and responsibly. The trade unions and employers and their organizations are desirous of resolving their problems through collective bargaining though in resolving such problems the assistance of appropriate government agencies might be necessary in public interest. Collective bargaining, therefore, is the corner stone of good relations and hence, the legislative framework of industrial relation should aid the maximum use of the process of mutual accommodation. The workers' and employers' organizations should be desirous of associating with the government agencies in consideration of general, social and economic measures affecting employers' and workers' relation. It cannot be ignored that the governments make certain possible efforts to establish an effective and universal labor management relations in India. An analysis of the roles played by the management, the trade unions and the government may reveal how their interactions influence industrial relations and what are the factors which cause impediments in the maintenance of cordial industrial relations.(5)

The Role of Management

For peaceful industrial relations, it is primarily essential that a management should have progressive outlook and democratic approach. Autocratic approaches, rigid and prestigious attitude on the part of the management and fragmentation have been the fundamental causes of most of the industrial strife .In many cases the role management has led to serious industrial unrest. Many employers are still reluctant to recognize the role of employees as partners in a common endeavour, rather they have developed a superiority complex and consider it below their dignity to sit around the conference table and discuss to settle the disputes with the people whose hands and clothes are soiled, bearing the mark of their hard labor. Even genuine disputes are not settled in a spirit of accommodation but dilatory tactics are employed to keep settlement in abeyance through the delays in the process of conciliation, adjudication and writes to courts leading to the resentment amongst the workers.

Even when collective bargaining is resorted to for settlement of disputes, the representatives of the management are not vested with adequate authority to decide the demands at the bargaining table, making the whole process a farce and causing a credibility gap in the minds of the workers. Many management have not instituted a regular procedure for redressal of grievances arising out day to day matters with the results that minor irritants continue to pile up the entire work environment. Many management are totally oblivious to the basic human needs to the workers and their aspirations, their need for security, provision of basic amenities, prospects for career growth recognition of good work etc, leading to an estrangement between the workers and the employers. Thus, progressive outlook and democratic approach towards workers are needed for cordial relations and this can play vital role in maintaining industrial peace.

The Role of Trade Unions

It has been noted that despite some of its similarities with other organizations, a trade union is different in its own way, in terms of internal organizational dynamics. The uniqueness of trade unions seems to rest on the fact that although they are formed by workers, they themselves pose a threat to their very survival. No other organization seems to suffer from this paradox.(6)The fact that democracy is a key input for union organization and that it finds a ready place in relatively small unions because of active membership participation, need not, however, encourage one to advocate that small unions be operated in industry. Having too many small unions has its obvious limitations. Fragmented trade union movement in the country is an important factor which gives rise to many industrial strifes in the country. The multiplicity of trade unions with different political ideologies and inter and intra union rivalries have vitiated the work environment with each union vying with the other for the predominant place in the industrial establishment. The problems of multiplicity of unions at both the plant and the industry levels have posed a serious threat to the maintenance of industrial peace and harmony in India.

In India, the prevalence of outside leadership, the apathetic and non-committed rank and file, the existing loopholes in labor legislation and the national trade unions altogether different political ideology and orientation,

are acting together as major forces to boost up the numerical growth of Indian trade unions. The mushroom growth and multiplicity of trade unions are attributable to the provision of the Trade Union Act, 1926, whereby any seven persons in an organization can form a trade union and raise industrial disputes. The above factor is further compounded by the affiliation of the various trade unions of different political parties with each politician trying to carve out an important place for occupying a position of influence for him. Quite often the management becomes the worst victim of these feuding trade unions and their vested interest. In recent years a new development has appeared on the horizon of trade unions and that is the growth of many parochial unions along linguistic, regional and individualistic lines, vitiating the entire socio-economic and industrial atmosphere. Lack of education and leadership among the workmen leads to vesting leadership of trade unions in the hands of persons who are aliens to the industry and the role of such leadership has generally been detrimental to harmonious industrial relations despite the fact that the Government is spending immense amount of money on workers education. It can undoubtedly be realized that trade unionism has a constructive role to play in the industrial relations scene of the world. We cannot ignore the role of trade unions in industrial harmony.

The Role of Government

The pattern of labor- management relations in India has increasingly been structured by the government. "In India the Government has been playing, particularly after Independence, a comprehensive and dominant role in shaping the pattern of industrial relations"(7)

The difficulties in developing a committed industrial labor force, the rivalries and weaknesses of the Indian trade union movement, the failure of many Indian and foreign employers to deal fairly with workers or constructively with trade unions, and the resultant labor discontent and strife have encouraged government intervention in order to contain, channel and redirect incipient and actual labor protest. Increasingly, planning objectives for rapid economic development have been given priority and the pattern of labor management relations has been expected to conform these objectives. Government was not always so active in guiding labor management relations in India. Before Independence, or at last before the war, the role of the government was passive, as it will be seen in a brief examination of labor legislation prior to 1947. But, faced with the problems of a new nation and post-war labor unrest, government became an active intervener with passage of number of new laws, beginning with the Industrial Dispute Act of 1947.

In the mixed economy we have in this country, the state has now emerged as a big employer. One significant aspect of its role is to evolve norms or standards through tripartite forums to act as guidelines for shaping industrial relations. The Government also accepts the responsibility of ensuring conformity to these norms through the administrative and judicial machinery. This is a direct form of intervention, for the state enacts legislation and also assumes the responsibility of implementing substantive and procedural laws.

The Government's industrial relations policy is part of its broader labor policy, which has been stated by the National Commission on Labor in terms of its main postulates. The main tenets of the policy are: Primacy to the maintenance of industrial peace ; Encouragement of mutual settlement, collective bargaining and voluntary arbitration; Recognition of the worker's right to peaceful direct action, i.e. strike; and Tripartite consultation.

The State intervention primarily aims at preserving industrial peace and has, therefore, focused attention on (1) the avoidance of industrial disputes and (2) an expeditious settlement of industrial disputes when they do arise. The State has done little in India about the positive aspects of labor relations, such as encouraging the growth of strong and effective trade union movement by providing for trade union recognition, by promoting a stable relationship between the parties by fostering the growth of collective bargaining. Though its policy pronouncements, considerable importance is assigned by the Government to building up of a stable bipartite relationship between the management and the labor, the machinery for settling industrial disputes by the Government intervention is often pressed into action in preference to the method of bipartite negotiations and collective bargaining. Only about 25 percent to 28 percent of the disputes are resolved through mutual settlement.

The adjudication and the other regulative aspects of the role of Government continue to form the core of industrial relations in India. Although compulsory adjudication and extensive public regulation of labor management relations constitute the corner- stone of the Indian industrial relations system, it is clear that the government authorities place great deal of importance on the development of stable bipartite relationships between the labor and the management. Inevitably the progress is slow, and this justifies the additional steps to train and to improve the quality of unions and managements. (8)

Thus, The Government can enact legislation to curb the menace of industrial disputes in India or elsewhere.

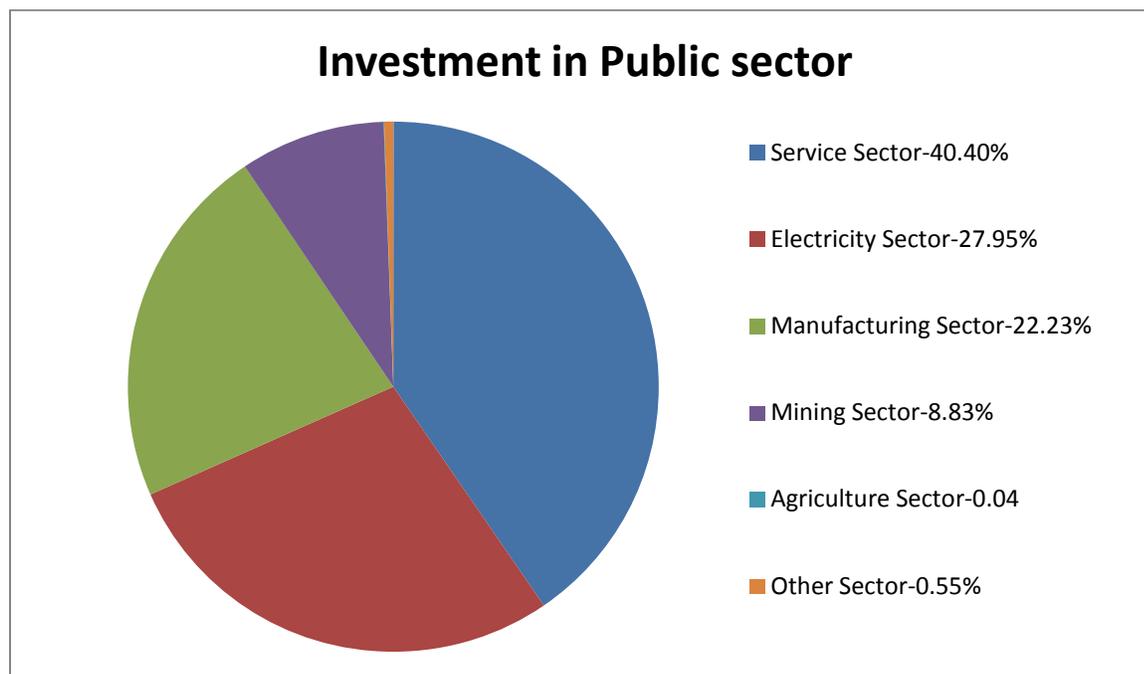
Industrial Relations in Public Sector

After Independence, India adopted mixed economy, which consists of Private and Public Sector. The industrial policy has laid emphasis on optimum utilization of installed capacity and expansion of industries as part of a wider strategy for the revival of the industrial economy. The development of Public Sector has been one of the main objectives of priority in our industrial policy.

In India, even today an era of privatization, Public Sector has been playing a very significant role in the development of basic industries. Before 1991 in India, the Railways, Post and Telegraph, Air Transport, Banking, Insurance and many basic industries were in Public Sector and in its monopoly. Thus, before 1991, the Public Sector was the largest employer in India and Private Sector employed only a little percent of labor force in India.

CENTRAL PUBLIC SECTOR ENTERPRISES in India

There were 242 Central Public Sector Enterprises (CPSEs) under the administrative control of various Ministries/ Departments as on 31.3.2008. The cumulative investment (paid-up capital plus long terms loans) in all the CPSEs stood at Rs. 4,55,409 crore as on 31.3.2008. The largest share in this investment belonged to the service sector (40.40 per cent) followed by electricity (27.95 per cent), manufacturing (22.23 per cent), mining sector (8.83 per cent) and agriculture (0.04 per cent). The remaining 0.55 per cent belonged to CPSEs under construction. While 'investment' in all the CPSEs grew by 8.31 per cent in 2007-08 over 2006-07, capital employed" in all the CPSEs went up by 15.63 per cent during the same period (Table 8.19). A great deal of investment in CPSEs is being made through internal resources rather than through investment from out side.



Diagrams:1 Pie Diagram of cumulative investment (paid-up capital plus long terms loans) in the Public Sector as on 31.3.2008 done By the Government of India
(Source: Economic Survey-2008-09)

To provide level playing field with the private corporate sector, the Government has delegated enhanced financial and operational powers to the Navratna, Miniratna and other profit making CPSEs. National Aluminium Company

Limited (NALCO), National Mineral Development Corporation Limited (NMDC), Power Grid Corporation of India Limited (PGCIL), Rural Electrification Corporation (REC), Coal India Limited (CIL) and the Shipping Corporation of India Limited (SCI) have been granted Navratna status in 2007-08 raising the total number of Navratna companies to 18. Eight more CPSEs, namely, the Airports Authority of India, Broadcast Engineering Consultants of India Limited, Cochin Shipyard Limited, Hindustan Copper Limited, Indian Railway Catering and Tourism Corporation Limited, Mishra Dhatu Nigam Limited, National Hydroelectric Power Corporation Limited and Satluj Jal Vidyut Nigam Limited have been granted Miniratna status, raising the total number of Miniratna CPSEs to 56. (9) The Public Sector had employed 54.65 percent of the total labor force in India in the year 1961 which had marked growth to about 70 percent in 1985. It is however a well known fact that private sector employed only a little percent of labor force in India before 1991. The major share of the public sector employment is in the “services”, 81.49 in 1985 following transport and communication, 29.07 and the third comes, manufacturing 17.60. While Service forms the major share of employment in the Public Sector, manufacturing is the most potential area of employment in the private sector in India. This is, perhaps, the major deviation of employment in the public sector compared to the private sector. Materially the industrial relations pattern may reveal a little deviation in the public sector.

Disputes in India Before 1990

The Table 1.1 indicates the number of disputes, man days lost and value of production lost in public sector and private sector. The table analyses the number of disputes to be found more in private sector than that in public sector. But there was increasing trend of disputes in public sector after 1976 than the private sector. The value of production lost and man days lost also indicate the same trend i.e. increasing trend. Thus, comparatively the public sector has greater cordial industrial relations than that of private sector.

Table 1.1 The Number of Disputes, Man days Lost And Value of Production Lost

Year	No. of Disputes		Man Days Lost		Wage Lost (Rs. in Crores)		Value of Production (Rs. in Crores)	
	Public Sector	Private Sector	Public Sector	Private Sector	Public Sector	Private Sector	Public Sector	Private Sector
1976	153	1306	872	11874	0.70	11.63	4.00	88.31
1977	663	2454	4471	20849	4.56	17.24	35.42	249.06
1978	947	2240	4348	23992	5.69	19.21	48.02	237.30
1979	1071	1977	7655	36198	10.15	35.99	58.54	384.48
1980	968	1888	4134	17791	6.52	21.04	33.04	264.10
1981	707	1882	10006	26517	25.86	20.97	337.52	291.24
1982	799	1684	10360	64254	7.60	25.65	74.48	349.69
1983	884	1604	4453	42406	7.22	42.83	31.95	398.12
1984	592	1502	7871	48154	18.02	49.18	56.40	471.66
1985	401	1354	3202	26037	4.84	31.56	29.06	345.46
1986	389	1503	2572	30176	6.11	39.20	40.06	783.52
1987	422	1357	5237	30121	10.26	43.62	108.25	531.43
1988	564	1181	6633	27314	15.46	46.49	71.62	622.62
1989	361	659	2937	12244	14.15	10.56	65.04	218.43

Source: Indian Labour Year Books and Economic Survey 1991-92

On the basis of above table we can conclude that private sector has more industrial disputes than public sector before 1990. Even though Man days Lost in public sector were not very conspicuous as compared with the same in

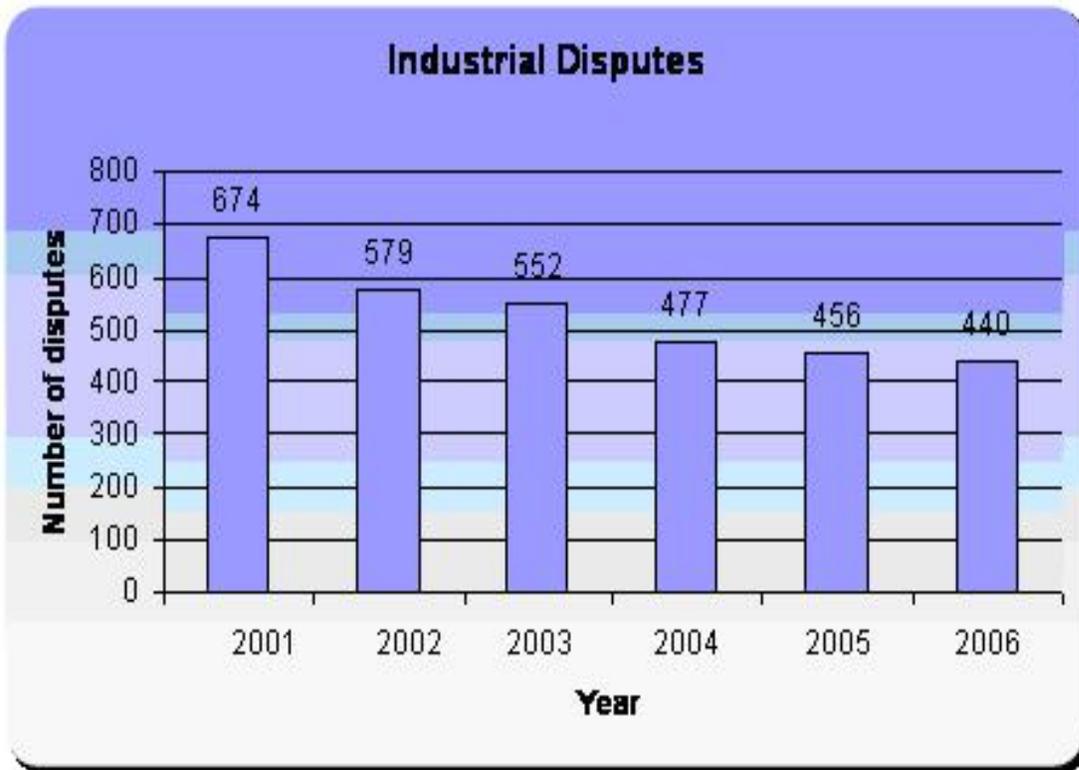
private sector, productivity has been lesser in many of the public sector units as compared to private sector. In fact, many of the public sector enterprises have been running in loss. Besides Man Days lost there are certain other variables that affect the production potentialities in the public sector. In fine, industrial disputes take a peculiar shape in the public sector. Rather than resorting to direct strike, trade unions in public sector adopt certain other strategies like, “go slow”, “tool down”, “pen down”, “work to rule” and so on. Which do not affect the formal attendance but actual productivity suffers. In the private sector trade unions resort to direct action like strike than go slow, tool down etc.

Thus, Industrial Relations in Public Sector Units are peaceful. National Commission on Labour observed, “It is equally necessary to caution that the public sector can not reach the position required of it by the effort of management alone. There has to be responsible cooperation from labor as well. If a model employer is the obvious side of a coin, the “model worker” is its reverse. One cannot exist without the other”.(10) Thus, the labor force are equally responsible for mutual cordial industrial relations and, they should continue to cooperate with the management for the betterment of industrial health and the affluence of our national economy. It will be finally accepted that a harmonious relationship between the management and the workers will go a long way in bringing about a better climate for the functioning of industries in India. This will also save a lot of waste in this field caused through disharmony between the management and the labor.

Disputes in India after Globalization Policy

The number of industrial disputes in country has shown slow but steady fall over the past ten years. In 1998, the total number of disputes was 1097 which fell by more than half to 440 in 2006. It is being estimated that this trend will continue in 2007 as well. To support this, only 45 cases of disputes have been recorded during the first four months of 2007. This significant decline is attributed to the serious attempts made by industries to improve industrial relations with their workers. However, a deeper look at the data reveals that the number of mandays (i.e., the industrial unit of production equal to the work one person can produce in a day) lost due to disputes has not come down as significantly. The country, on an average, lost 25.4 million mandays of work annually between 1998 and 2006, which might have affected its industrial output.

More than 2.14 lakh man days were lost due to work stoppages in 23 industrial disputes during January to March 2007. Though there has been a decline in the number of strikes, the country still witnessed some major strikes between 2004 and 2006, like those in Honda, Escorts, Apollo, and Skumars factories and in SBI bank.



Source: industrialrelations.naukrihub.com

Table 1.2 Comparative Study of Industrial Disputes in Public and Private Sector

Sectors	2003	2004	2005
Public Sector			
No. of disputes	59	49	57
Workers involved ('000)	1099	1590	2039
Mandays lost ('000)	6856	1806	2322
Wages lost (Rs. in crores)	39.35	82.52	79.09
	-47	-41	-44
Value of Production loss (Rs. in crores)	27.47	36.97	59.8
	-22	-22	-19
Private Sector			
No. of disputes	493	428	399
Workers involved ('000)	717	482	875
Mandays lost ('000)	23400	22061	27343
Wages lost (Rs. in crores)	26.79	25.64	37.02
	-144	-119	-102
Value of Production loss (Rs. in crores)	391.02	318.62	285.28
	-127	-109	-102

Source: industrialrelations.naukrihub.com

On analyzing the data sector wise, it is clear that the private sector has witnessed greater number of disputes as compared to the public sector. In 2005, only 57 disputes were recorded in public sector which resulted in a wage loss of 79 Crores. In contrast to this, 399 disputes were recorded in the private sector. In the recent past, maximum number of disputes has been recorded in the manufacturing, agriculture and mining and quarrying industries.

Conclusion

What is more important, however, is not the absolute number of disputes as such but magnitude thereof as measured by the number of mandays lost. There have been serious causes of industrial disputes in the past in the public sector, involving a large number of workers and a loss of lakhs of mandays. Railways, Air India, Post and Telegraph, Steel units and many others have experienced long strikes in the recent past. The major industries which account for considerable loss of man-days in the public sector in India are generally transport and communication, electricity, gas, water, and sanitary services; mining and quarrying; and manufacturing, whereas in the private sector, manufacturing industry alone accounts for about three-fourths of the total mandays lost during a particular year.

An analysis of the industrial disputes reveals that the number of formal disputes in public sector is fewer than private sector. It goes to support that wages and personnel reasons have been the most important causes. Other reasons are also equally important such as intra-union rivalries. Thus; Industrial Relations in Public Sector Units are peaceful. For this the management and the workers are equally to be credited. As Prof. J.S.Mathur has rightly pointed out that "Society cannot allow workers and management to follow the law of jungle".(11)

It goes without saying that harmony and cohesion determine the success of an organization. It is true for all times that no organization can function effectively if there are constant strifes and turmoils between the management and the labor. It is impossible to introduce any innovation or effect any productivity improvement exclusively through the various industrial engineering techniques. Looking at Industrial Relations, therefore, from a broader national and economic view point, it is an important pre-requisite for national and economic growth of a country. One of the major problems of a developing country is to increase the per capita income of the population through the rapid industrialization as well as through the improvement in agricultural field. Industrialization will solve unemployment problems in developing countries and will help in achieving a better standard of living. This survey is aimed at studying the industrial relations in the public sector in India. Several difficulties were noticed in the course of the study regarding the behavior of employers, workers, union leaders and government officials. It never remained lower than 30 per cent, it has shown an increase to 37 per cent in the last decade. 'Personnel' and 'retrenchment' is another cause of industrial disputes, through it has declined from 29 per cent to 25 per cent. The 'bonus' is another cause, under which the disputes, the inter-union rivalry is important though the proportion has come down from 30 to 20. However, it may be noted that the most important cause has been the economic condition.

However, Industrial relations in public sector are cordial comparatively private sector but not very cordial. The reason being:

- (i) Much importance is not assigned to implementation of the various tripartite and other agreements promptly by the management, as it is not a party to these.
- (ii) Though most of the public sector enterprise's bosses are often good administrators but as they have failed as successful business managers with requisite ability and skill in general and personnel manager techniques.
- (iii) Bureaucracy, red-tapism, corruption and evasion of responsibility are also responsible for good labour-management relations.
- (iv) By virtue of political affiliations trade union problems are usually discussed with the respective managements. In such a process, the managements of the units become ineffective and demoralized which affect the personnel and industrial practices of the enterprises.
- (v) The Government interference in these enterprises also fuel to the fire, and the workers become indisciplined.

Suggestions have, therefore, been made here to improve the industrial relations between the management and the labor and to avoid strikes in the public sector as well as in private sector. **The following remedies may be useful in globalization era:**

The Government should not take the recognition back at the time of strike and should come forward for the discussion of the demand.

An effective two way channel of communication should be developed in the undertakings to ensure that workers grievances are communicated to the authorities and that the workers understand properly the causes and purpose of the orders issued by the officers. Though, there is proper down-ward communication in the Public Sector, there is greater need to improve upward communication. This may be effectively done by the introduction of a new suggestion scheme to develop the innovation ideas of the employees in this globalization era.

By delegating authorities to workers and by workers' participation in the management, the problem of low standard of workers and maintenance of discipline can be solved. This will increase efficiency of workers and will create common interest in the work.

Proper social security schemes should be implemented.

To solve the problem of multiplicity of trade unions which exist in many public sector, the management should recognize a majority union as a bargaining agent in the public sector. It must be decided by a proper procedure and with the assistance of labour commissioner.

Mostly disputes arise in the public sector due to wages. This economic cause of dispute can be removed, to a large extent, by enforcing minimum wages and thus ensuring a reasonably decent standard of living for the workers by enacting rules and regulations and enforcing social security measures.

Lastly, it may be suggested that an organization must be innovative and should follow the policy of self renewal and personnel audit in this globalization era. It is earnestly hoped that the management would look into the possibility of introducing the suggested reforms for the betterment of the corporate image of public sector. A single remedy cannot solve the entire problem so, all remedies should be taken into consideration as required by the situation. Further, it should not be forgotten that a labor-management relations would be successful only if it succeeds to ensure the devotion of both the components: the employers and the employees. A harmonious equation between the management and the workers is the backbone of success of an industrial organization. If the employers are imaginative and humane, the employees are bound to respond favorably.

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The Global Impact of Cloud Computing As an IT Organizational Model

J. S. Boyce, Professor of Computer Science at Montgomery College, 7600 Takoma Ave, Takoma Park, MD 20912

jsboyce@att.net

What is Cloud Computing?

Cloud computing is using massive computing resources, deployed among virtual datacenters, dynamically allocated to specific users and tasks and accessed as a service via an user interface (UI), such as a web browser.

Tim Jones in his description of Open Stack comments, “Cloud computing architectures tend to focus on a common set of resources that are virtualized and exposed to a user on an on-demand basis. These resources include compute resources of varying capability, persistent storage resources, and configurable networking resources to tie them together in addition to conditionally exposing these resources to the Internet.”

The physical cloud resources may reside in a number of locations, the details of which are not typically known to the service’s users. Cloud resources are offered as a service on an as needed basis. The cloud itself typically consists of large numbers of commodity-grade servers, harnessed to deliver highly scalable and reliable on-demand services For established enterprise software vendors; the cloud introduces a range of significant issues. Cost reduction is promised via the cloud means massive reinvestment in profitable products to make them cloud-ready, and deep uncertainty about whether such products can be priced at a point that will continue to ensure the lush margins to which the industry has grown accustomed. These investments make the investments made legacy systems obsolete such that they must be altered or replaced to take advantage of dynamic allocation of resources. How will organizations define and analyze the costs to transfer to a cloud base data system. Criteria to analyze the intended benefits include metrics to combining the Advantages of Cloud and Enterprise Security, weigh the differences between Private/Public/Hybrid Clouds, levels of Security provided to the users; end-to-end factors such as storage, network, meta-data, and determinations of internet versus intranet storage.

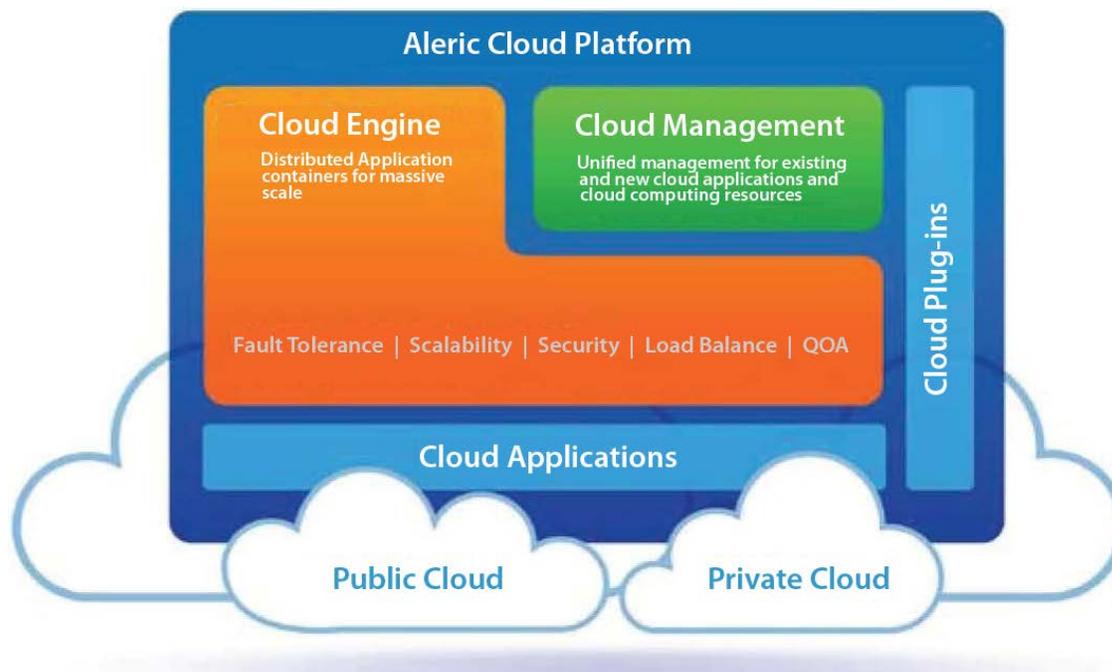
Several ways are used to customize for verticals: these include

- By application or SOA – financial, media, healthcare
- By customer – strategic/tactical
- By case – e.g. SLA customized to ROI

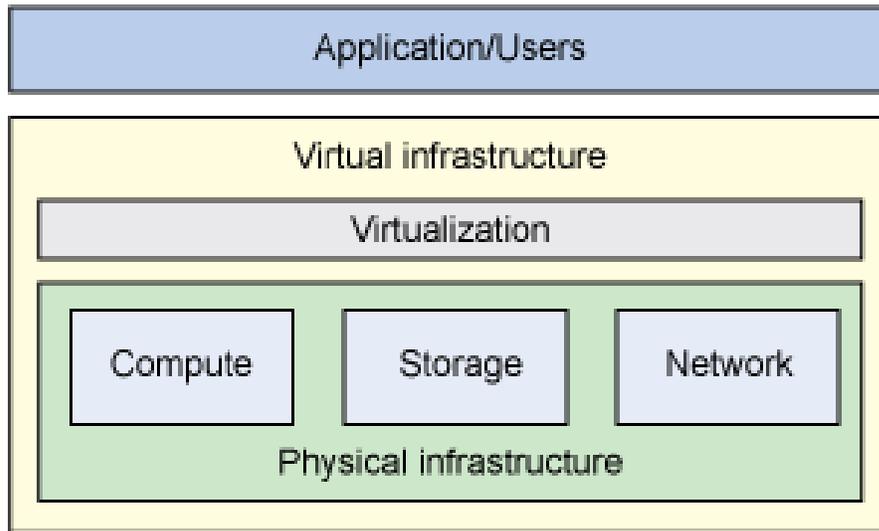
All cloud providers promise turnkey and automated management, but hidden costs include the transition and training costs for the organizations data gatherers and data transfer protocols. Changes in procedures become less flexible as they cannot be incurred internally. Below is a table of some basic cloud technologies with their strengths and weaknesses.

Technology	Key Feature	What's Missing
Grid Computing	Job scheduling across many machines	Difficult to administer; Lacks broad applicability of cloud computing
Virtualization	Virtual machines decouple OS from hardware	Fail to fundamentally solve scale and reliability
IaaS Infrastructure-as-a-Service	Computational infrastructure available for rent	Lacks security, vertical solutions,
SaaS Software-as-a-Service	Application availability through the cloud	SaaS is an application on the cloud, not a cloud by itself
Utility Computing	Packaged computing, application, and storage sold as a service	Describes a business model, not a technology or architecture

Basically this approach to business opens up new technology partners and organization want to be current and trendy. The emergence of an entire new set of companies and service providers try to capitalize on the term “Cloud” to further their business interests. They provide provide technology and services where cloud-based business applications can be deployed and tailored to a business’ or partner’s needs - by market or industry. Each cloud service provider claims its cloud platform is unique in its formation and history; they combine terms such as in Global Management, Enterprise Security, and Virtualization. The partnership is touted as a mutually beneficial, to ensure the success of relationship. Graphic models are used to allow businesses to grasp the concepts. Corporations such as Aleric International were quick to produce consulting and mentoring options for their clients.



IBM joined the cloud IAAS world in 2010 with their representation called OpenStack:



The shift to cloud changes the hardware and platform requirements as the organization reevaluates its enterprise structure. Some say the tangible becomes intangible, and money is fungible. As personnel are reduced, so is the visibility of the process. Management roles become more virtual, and data security becomes the key element.

Why should Business Education care?

Fundamentally it changes the way we do business, acquire clients, distribute goods and services, and assess productivity. It also changes the job market while altering current management models.

Changing the Curriculum

Information Systems and Business Decision-making programs will need to make drastic modifications in their curriculum as the closed models of IT in organizations have been redefined. A course in Cloud Computing should become part of the Information Systems and Business Curricula. Below are some sample outcomes for a basic course in Cloud Computing which requires a basic understanding of business processes.

Upon completion of this course a student will be able to
Define open source cloud computing structures and procedures for enterprise implementation.
Explain the economics of cloud computing at the enterprise level.
Examine the concepts of web application and consider the viability of various web applications.
Integrate the concepts of virtualization with the install/practice of virtualization

systems.
Compare and contrast the merits of best practices in cloud services.
Model distributed storage and security structures and discuss issues in cloud computing, including risks and disaster recovery tools.
Explore the next generation of cloud computing architectures/models/tools.

More advanced technical courses in IT management will evolve as organizations assess Return on Investment and Cost/Benefit Analyses over time. Training costs for personnel to transition to these new processes will also create an entirely new market for education and training.

What about Software Skills?

Cloud computing requires an understanding of enterprise systems as well as considerable knowledge in Web design and Architecture. The platform of most cloud systems is Unix/Linux. In Jones discussion of Open Stack,

Cloud computing architectures tend to focus on a common set of resources that are virtualized and exposed to a user on an on-demand basis. These resources include compute resources of varying capability, persistent storage resources, and configurable networking resources to tie them together in addition to conditionally exposing these resources to the Internet. (Jones, 1.)

The curriculum for an Information systems program that focuses on Cloud development would include the following*:

Web Architecture Design and Application Development

- Service-Oriented Architecture (SOA) implementation
- Object-Oriented Analysis and Design
- Java Platform, Enterprise Edition (Java EE) Application Development
- Web 2.0 Application Development

Mainframe Development

- Systems Analysis and Design
- COBOL/CICS/DB2 Development
- Database Design

Web Application Integration

- Web-enabling back-end applications
- Integrating legacy systems
- Accessing back-end database resources

*It is interesting to see the reemergence of COBOL and DB2 in IBM's definition of required skills for their Open Stack development team.

Cybersecurity is a Business Issue!

Cloud computer changes the privacy of data, as it changes the autonomy of the company. As a differentiating solution, the utility of computing becomes an enterprise level concern. Key to success is the carrier reliability and geo- and application targeted networks. Business models need to be reinvented to be more community-drive and clouds built for the benefit of all participation.

How Do We Accomplish Virtualization?

As IT technology becomes the Global Cloud, it will be necessary to evolve into a next generation of computing with patent-pending security structures, and open cloud applications platforms. The focus of the business model has been core competence and forming partnerships with leaders. New modes of community, defined on a global scale, will require corporate changes in the definition of participants, management, and customers. New networks will also rely more heavily on mobile interfaces that are more flexible, reliable, and secure. For computer education programs at colleges and universities, it will require new methods of teaching system designers, and database managers, where portability, expandability and risk management will become central components of the curriculum. Texts will have to be redesigned and research projects created to create metrics for productivity and IT success.

Thus cloud computing opens and new era of business and computing education that shifts the emphasis from the local to the global.

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“The Scope of Marketing Ethics and Social Responsibility: A Close Relationship”

By Dr. Dandeson Panda and Mrs. Muna Elobaid

Ethics and social responsibility are often times used interchangeably as being related, but they are not the same. Marketing ethics examines these ethical issues that are specific to the domain of marketing. Companies are putting their best foot forward in an attempt to adhere to the sound ethical principle as a continuous and dynamic process. It is vital to the success of any marketing company to make good ethical decisions with the realization that marketing professions is often singled out among business discipline as the root cause of many ethical lapses such as unethical advertising and the promotion of unfit products to name a few. It is no surprise that... in the manufacturing of bad products; poor services that could harm consumers as well as damage the environment; child labor and at home... and, the practice of deception in advertising, or the marketing of dangerous products.

Ethics is a set of beliefs about right or wrong, good or bad; marketing ethics involves the application of right or wrong judgment in the workplace. Specifically, ethics is pertaining to individuals and their day-to-day decision-making. Understandably, the decision of each individual can impact the entire organization. In reality, ethics deals with the moral values that govern the action and decisions of an individual or group. These moral values serve as guidelines on how to act rightly and justly when faced with moral dilemmas.

Social responsibility is the obligation of a business to contribute to society. That is because business organizations are a part of a larger society and are accountable to that society for their actions. In effect, the most socially responsible companies feature proactive policies that focus on meeting the needs of all, including stakeholders, employees, customers, and the broader community. The posture of a company on social responsibility sets the tone for that organization, and clearly influences the decisions of the individual employees.

Marketing ethics and social responsibility share a dynamic and interactive relationship that plays a vital role in building both profitable business and a vibrant community. For instance, it is generally perceived that marketing decisions and the ethical issues are intertwined. Unlike professionals in accounting or finance. Marketers constantly interact with the public. Due to this type of interaction, marketers and sales people are expected to be trustworthy and diligent. Research shows that many consumers are sometimes skeptical of some businesses and their marketing. This is due to competition, profitability and sustainability for their survival. Newer the less, ethics and marketing professionals have an excellent opportunity to build public trust if they so deserve. They can create an ethical climate that can specifically address the health and well-being of consumers as their number one priority

Establishing an ethical climate in the workplace:

An ethical climate within a marketing organization lays out a set of values that guides decision making and behavior. For instance, the Johnson and Johnson “Creed” published in 1943 is a one page document outlining the company’s commitments and the responsibilities to the various stakeholders. A portion of the Johnson and Johnson “Creed” reads:

We believe our first responsibility is to doctors, nurses, patients, mothers, fathers, and all others who use our product and services. We are responsible to our employees. We must respect their dignity and recognize their merit. Compensation must be fair and adequate and working conditions clean, orderly and safe. We are responsible to the communities in which we live and work and to the world community as well as our final responsibility to our stockholders. When we operate according to these principles, the stock holders should realize a fair return.

- Understandably, every employee within a marketing company must share the company’s ethical values and how to these values translate into the business activities of the firm. It is the responsibility of top management to commit to creating an ethical climate, and employees throughout the firm must be committed to that climate. Though each person is different from others, yet competing values prevail – to avoid turmoil and conflict between employees. A system of control must be in place to avoid critical dilemma. Thus employee’s behavior should be in line with company’s ethical values. Consequently a company notes and punishes inappropriate behavior.

The American Marketing Association code of ethics spells out the ethical norms and values for marketing. These codes are accepted by marketers as the universal ethic standards. Hence the following Synopsis of the ethical norms and values for marketers:

1. Ethical Norms
 - a. As marketers we must:
 - i. Do no harm.
 - ii. Foster trust in the market system.
 - iii. Embrace ethical values.
2. Ethical Values
 - a. Honesty: be straight in dealing with customers and stakeholders. To this end we will:
 - b. Strive to be truthful in all situations at all times
 - c. Offer products of value that do what we claim in our ???
 - d. Stand behind our products if they fail to deliver their claimed benefit.
 - e. Honor our explicit and implicit commitments and promises.
3. Responsibility: accept the consequences of our marketing decisions and strategies. To this end, we will:
 - a. Strive to serve the needs of consumers.
 - b. Avoid using coercion with all stakeholders.
 - c. Acknowledge the social obligations to stakeholders that ?? with increased marketing and economic powers.
 - d. Recognize our special commitment to vulnerable market segments such as children, seniors, the economically impoverished, market illiterates and others who may be substantially disadvantaged.
 - e. Consider environmental stewardship in our decision making.
4. Fairness: To balance justly the needs of buyers with the interest of the seller. To this end, we will:
 - a. Represent products in a clear way in selling, advertising and other forms of communication; this includes the avoidance of false misleading and deceptive promotion.
 - b. Reject manipulations and sales tactics that harm consumer trust.
 - c. Refuse to engage in price fixing, predatory price gauging or “bait and switch” tactics.
5. Respect: Acknowledge the basic human dignity of all stakeholders. To this end, we will:
 - a. Value individual differences, and avoid stereotyping customers, or depicting demographic groups (eg. gendor, race, sexual orientation in a negative or dehumanizing way.
 - b. Listen to the views of customers and make all reasonable efforts to mentor and improve their satisfaction on an ongoing basis.
 - c. Make every effort to understand and respectfully treat buyers, suppliers, intermediaries and distributors from all cultures.
 - d. Acknowledge the contributions of others such as consultants, employees and co-workers to marketing endeavors.
 - e. Treat everyone, including our competitors, as we would wish to be treated.
6. Transparency: create a spirit of openness in marketing operations. To this end, we will:
 - a. Strive to communicate clearly with all constituencies.
 - b. Accept constructive criticism from consumers and other stakeholders.
 - c. Explain and take appropriate action regarding a significant product or survive risk, component substitutions or other foreseeable eventualities that could affect customers for their perception of the purchase decision.
 - d. Disclose list price and terms of financing as well as available price deals and adjustments.
7. Citizenship: Fulfill the economic, legal philanthropic and societal responsibilities that serve stakeholders. To this end, we will:
 - a. Strive to protect the ecological environment in the execution of marketing campaigns.
 - b. Give back to the community through volunteerism and charitable donations.
 - c. Contribute to the overall betterment of marketing and its reputation.
 - d. Urge supply chain members to ensure that trade is fair for all participants, including producers in developing countries.
8. Implementation: We expect members to be courageous and proactive in leading and/or aiding their organizations in the fulfillment of the explicit and implicit promises made to those stakeholders.

Turning the issue of social responsibility, it is sometimes difficult to box in the nature and scope of social responsibility due to the diversity of values, present in different societal settings, businesses and corporate cultures. However, to understand social responsibility in marketing, an attempt is made here to view this issue from those different concepts of social responsibility.

Three concepts of social responsibility:

1. Profit responsibility
2. Stakeholder's responsibility
3. Social responsibility

Each of these three concepts of social responsibility relates to particular continuances. There is often conflict in satisfying all continuances at the same time.

Profit responsibility means that companies have a duty to maximize profits for their stockholders. The words of Milton Friedman (1962) clearly express this idea: "There is one and only one social responsibility of business – to use its resources and engage in activities designated to increase its profits as long as it stays within the rules of the game; which is to say, engage in open and free competition without deception or fraud.

Stakeholder's responsibility applies if the profit motives of companies lead to a wider issue of social responsibility. Stakeholder's responsibility specifically looks at the obligation a company has to those who would affect the achievements of its objectives. Participants in this group include consumers, employees, suppliers, and distributors. A good example of fraud is the account of Perrier's water bottle exercise, especially when Perrier recalled 160 million bottles of water worldwide, because of a toxic chemical found in the bottle? The bottling company acted responsibly to keep the quality and purity of water sold to consumers. Societal responsibility generally warrants voluntary actions taken by a company to address the ethical, social and environmental impacts of its business operations.

Consumer ethics and social responsibility:

A core responsibility of companies is to deliver consumer value by providing quality products at fair prices. Honesty and communication are critical components of the equation. On the other hand, all consumers also have an obligation to behave or act ethically and responsibly in the exchange process and in the use and disposition of unwanted products. However, unfortunately, unethical consumer's practices are becoming a serious problem for marketers. Such acts include serious warranty claims such as misdeeming coupons, making fraudulent returns of merchandise; giving inadequate information on credit applications; tampering with utility meters; tapping cable TV lines; pirating music movies, and software from the internet, and submitting phony insurance claims. These unethical practices cost marketing companies large sums of money. Sometimes consumers tend to act unethically with each other, especially during online auctioning.

Due to the current state of the economy, many consumers turn to selfish and unethical ways of surviving. In such instances, their behavior is influenced by greed. Briefly put, greed is two-pronged:

1. A false belief that consumers can get away with unethical activity.
2. The rationalization that what is being done is correct.

Consumers should be responsible citizens in terms of what they purchase, keep or dispose with due concern for the environment. All consumers must be sensitive to ecological issues. Consumers should be willing to accept attitude change toward protecting the environment and to pay a little for environmentally-friendly products. In addition, consumers must seek appropriate information to make an informed decision with regard to the price of the products as well as usage and disposition of the unwanted product.

Social responsibility is a conception that has attracted worldwide attention and it deserves a new resonance in the global economy. Government has traditionally taken sole responsibility for the improvement of the standard of living of their people, the needs of society and population. However, government cannot over extend themselves to take care of all social responsibilities. For instance, individuals and business organizations also have roles to play too.

As mentioned earlier, consumers must make good use of available information to avoid any confusion about which products are environmentally safe. We would protect the environment we live in by adopting green products. Be careful about some misleading promotions about the environmental benefits of a product, service, technology, or company practices.

Businesses should make a commitment to contribute to sustainable economic development by engaging people and families to work as a team in their local communities. This being the case, businesses have an obligation to work towards meeting the utilitarian needs of a diverse population.

Ethical behavior and socially responsible practices in business extensively discussed in academic circles for many years. For instance, Aquilesr, 1994, Weiss 1994, Carroll, 1993, Drucker, 1984) argued against accepting all aspects of management practices in decision-making. However, some scholars argued that “businesses as usual is an essential element of society, it has a responsibility or and obligation, toward solving problems of public concern (Monsen 1974)that is in the self-interest of organizations to be socially responsible. However, Davis (1974) expressed the view that ethical behavior is more profitable and more rational than unethical behavior, and vital for the effectiveness of business organizations. (Velasquez,(1996)

Where as social responsibility principles have long been part of enlightened business practices, the concept has witnessed astounding ascendancy resurgence in recent years. Social responsibility has generated a worldwide interest in ethics and social issues in business. Hence the perception of the role of ethics and social responsibility in achieving organizational effectiveness.

On the contrary, ethics and social responsibility have also generated a lot of controversies in business as people have expressed views in favor and against this concept. According to Friedman (1962) “ business people do have a social responsibility other than making maximum profit for stakeholders. Friedman argued that when business people spend more money than they need to purchase delivery vehicles or to donate company funds to charity, they are spending shareholder’s money to further their own agendas.

Another view expressed states that businesses are created to produce goods and services, and not to handle welfare activities. To such view holders, becoming socially responsible might damage the reputation and image of the company in the marketplace. Spending money to clean up the environment, ensuring product safety and donating money and time for social issues all raise costs. This can be reflected in the prices of the goods and services a company sells.

Support arguments for social responsibility

Social issues such as pollution control, and poverty wages has caught the attention of businesses and businesses are determined now than ever before to correct these wrongs. Since most businesses have the resources, it is good for them to have the chance to repair social problems with the provision of an excellent working environment, safe product and giving accurate product information. However, when businesses fail to accept responsibility in correcting social ills, the government eventually steps in with formal rules and regulations to prevent social misconduct. Thus, global companies are persuaded to give back to ensure self-discipline standards. Companies that are socially responsible are usually successful and profitable. For example, successful companies such as General Electric, Texas Instrument, International Business Machines, and Wal-Mart are reputed to take a proactive position by taking on global problems. Such a stance increases profitability and also builds shareholders value. Wal-Mart has been proactive in making profit by being green. Wal-Mart has promised to use 100 percent renewable energy, drastically reduce waste through recycling and sell sustainable products that are more environmentally safe. Also, Wal-Mart is trying to cut costs on electricity and use compact fluorescent bulbs that will reduce carbon emission and save customers money.

Social responsibility is growing worldwide. The incentive put out by the United Nations Global Compact attracted many countries to be part of this program and to make their organizations more socially responsible. Many companies are now adopting social responsibilities with a view to improving operational efficiency.

In conclusion, through the marriage of ethics to marketing is not easy, yet it is a worthwhile act of social responsibility. This is not by any stretch of imagination a cheap endeavor but the payoff in the long-run to both society and industry will be rewarding.

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TQM and performance of Indian Automotive Industries

Sunand Kumar¹ & Jha, U.C²

¹ Professor & HOD, Department of Mechanical Engg., National Institute of Technology, Hamirpur(HP). Email : sunand@nith.ac.in

² Ph.D Scholar, Department of Mechanical Engg., National Institute of Technology, Hamirpur(HP). Email : jha.udai@gmail.com

ABSTRACT

This research presents new data and insights into the relationship between TQM implementation and organizational performance. The main purpose of this research is to determine the impact of TQM implementation on organizational performance in the context of Indian Automotive industries.

The main implication of the findings for managers/decision makers is that a typical manufacturing organization is more likely to achieve better performance in Customer Satisfaction with TQM than without TQM.

Keywords : , TQM, Organisational, Automotive, Performance

1. Introduction

Total Quality Management is a management approach that originated in the 1950's and has steadily become more popular since the early 1980's. Total Quality is a description of the culture, attitude and organization of a company that strives to provide customers with products and services that satisfy their needs. The culture requires quality in all aspects of the company's operations, with processes being done right the first time and defects and waste eradicated from operations.

Total Quality Management, TQM, is a method by which management and employees can become involved in the continuous improvement of the production of goods and services. It is a combination of quality and management tools aimed at increasing business and reducing losses due to wasteful practices.

TQM is a management philosophy that seeks to integrate all organizational functions (marketing, finance, design, engineering, and production, customer service, etc.) to focus on meeting customer needs and organizational objectives.

TQM views an organization as a collection of processes. It maintains that organizations must strive to continuously improve these processes by incorporating the knowledge and experiences of workers. The simple objective of TQM is "Do the right things, right the first time, every time". TQM is infinitely variable and adaptable. Although originally applied to manufacturing operations, and for a number of years only used in that area, TQM is now becoming recognized as a generic management tool, just as applicable in service and public sector organizations. There are a number of evolutionary strands, with different sectors creating their own versions from the common ancestor. TQM is the foundation for activities, which include:

- Commitment by senior management and all employees
- Meeting customer requirements
- Reducing development cycle times
- Just In Time/Demand Flow Manufacturing
- Improvement teams

- Reducing product and service costs
- Systems to facilitate improvement
- Line Management ownership
- Employee involvement and empowerment
- Recognition and celebration
- Challenging quantified goals and benchmarking
- Focus on processes / improvement plans
- Specific incorporation in strategic planning

This shows that TQM must be practiced in all activities, by all personnel, in Manufacturing, Marketing, Engineering, R&D, Sales, Purchasing, HR, etc.

1.2 Implementation Principles and Processes

A preliminary step in TQM implementation is to assess the organization's current reality. Relevant preconditions have to do with the organization's history, its current needs, precipitating events leading to TQM, and the existing employee quality of working life. If the current reality does not include important preconditions, TQM implementation should be delayed until the organization is in a state in which TQM is likely to succeed.

If an organization has a track record of effective responsiveness to the environment, and if it has been able to successfully change the way it operates when needed, TQM will be easier to implement. If an organization has been historically reactive and has no skill at improving its operating systems, there will be both employee skepticism and a lack of skilled change agents. If this condition prevails, a comprehensive program of management and leadership development may be instituted. A management audit is a good assessment tool to identify current levels of organizational functioning and areas in need of change. An organization should be basically healthy before beginning TQM. If it has significant problems such as a very unstable funding base, weak administrative systems, lack of managerial skill, or poor employee morale, TQM would not be appropriate.

However, a certain level of stress is probably desirable to initiate TQM. People need to feel a need for a change. Kanter (1983) addresses this phenomenon by describing building blocks which are present in effective organizational change. These forces include departures from tradition, a crisis or galvanizing event, strategic decisions, individual "prime movers," and action vehicles. Departures from tradition are activities, usually at lower levels of the organization, which occur when entrepreneurs move outside the normal ways of operating to solve a problem. A crisis, if it is not too disabling, can also help create a sense of urgency which can mobilize people to act. In the case of TQM, this may be a funding cut or threat, or demands from consumers or other stakeholders for improved quality of service. After a crisis, a leader may intervene strategically by articulating a new vision of the future to help the organization deal with it. A plan to implement TQM may be such a strategic decision. Such a leader may then become a prime mover, who takes charge in championing the new idea and showing others how it will help them get where they want to go. Finally, action vehicles are needed and mechanisms or structures to enable the change to occur and become institutionalized.

2. Effects of TQM Implementation

TQM has been widely implemented throughout the world. Many firms have arrived at the conclusion that effective TQM implementation can improve their competitive abilities and provide strategic advantages in the marketplace (Anderson et al., 1994a). Several studies have shown that the adoption of TQM practices can allow firms to compete globally (e.g., Easton, 1993; Handfield, 1993; Hendricks and Singhal, 1996, 1997; Womack et al., 1990; American Quality Foundation and Ernst & Young, 1991). Several researchers also reported that TQM implementation has led to improvements in quality, productivity, and competitiveness in only 20-30% of the firms that have implemented it (Benson, 1993; Schonberger, 1992). A study conducted by Rategan (1992) indicated that a 90% improvement rate in employee relations, operating procedures, customer satisfaction, and financial performance is achieved due to TQM implementation. However, Burrows (1992) reported a 95% failure rate for initiated TQM implementation programs; Eskildson (1994) and Tornow and Wiley (1991) reported that TQM implementation has uncertain or even negative effects on performance. Longenecker and Scazzero (1993) indicated that achieving high product quality and pursuing successful TQM implementation are highly dependent

on top management support. However, Motwani et al. (1994) reported that there is no association between top management support for quality and the level of product quality achieved. Many researchers suggested that effective product design can lead to the improvement of product quality (e.g., Gitlow et al., 1989; Juran and Gryna, 1993), whereas Motwani et al. (1994) reported that there is no relationship between systematic product design and the level of product achieved. Recently, Rungtusanatham et al. (1998) attempted to replicate, as closely as possible, empirical evaluation of a Deming-based theory of quality management conducted by Anderson et al. (1995). In their replication study, they used data obtained from three different Italian industries to compare with the reported results in Anderson et al. (1995), which used data from US-based firms. It was interesting to find that the research results between the two studies differed considerably. Thus, conflicting research findings have been reported surrounding the effects of TQM implementation on organizational performance.

3. Research Objectives

This research presents new data and empirical insights into the relationship between TQM implementation and organizational performance. The main purpose of this research is to determine the impact of TQM implementation on organizational performance in the context of Indian manufacturing industry.

As very few research on TQM has been done in the developing countries, so our aim is to analyze the status of the Indian manufacturing industry for TQM implementation, as India is becoming a major sourcing base for the world and there is a paucity of such research.

Based on the current TQM implementation in Indian manufacturing firms, this research aims at achieving the following research objective:

- To obtain the effects of TQM implementation on organizational performance in Indian Automotive Industries;

Thus, new knowledge related to TQM implementation in Indian manufacturing firms can be derived. In this research, new knowledge is generated from existing TQM knowledge integrated with specific characteristics of Indian automotive firms. After reviewing the existing TQM literature, it has become very clear that this research is the only one that systematically examines the effects of TQM implementation in Indian manufacturing industries.

3.1 Research Questions

Based on the research objectives, the extensive literature review, and informal talks with quality practitioners, three research questions have been proposed. They are listed as follows:

Question :What are the effects of TQM implementation on organisational performance in Indian automotive Industries?

3.2 Research Methodology

There were four main steps in the methodology used in our research study:

1. Choosing the appropriate performance measures.
2. Gathering a sample of organizations that have effectively implemented TQM.
3. Developing a questionnaire and distributing it to the selected organisations.
4. Empirical analysis of data obtained, to find the impact of TQM on organizational performance.

Any attempt to establish the link between TQM and organizational performance must focus on firms that have implemented TQM effectively. This is important because while most firms will claim that they have implemented

TQM, few are doing it effectively. Including non-effective implementers will obscure the impact of TQM. Effectively implementation means that the key principles of TQM such as focus on customer satisfaction, employee involvement, and continuous improvement are well accepted, practiced, and deployed within the firm.

We used the ISO 9000 certified companies in our sample because those companies know the basic of TQM principles & implementation. We also tried to incorporate more & more companies, who have won the quality awards. We found that the winning of quality awards as a proxy for effective implementation of TQM. A review of various quality award criteria confirmed that the core concepts and values emphasized are those that are widely considered to be the building blocks of effective TQM implementations. Awards are given after the applicant goes through a multi-level evaluation process where internal or external experts judge the applicant. A stringent process seems to be in place to ensure that winners are effectively implementing and practicing TQM.

A questionnaire survey was developed and distributed. The empirical data were obtained from a survey of ISO 9000 certified manufacturing companies. The responses of questionnaire survey were analyzed using a multiple regression technique. The reliability and validity (construct, content, criterion) of the practice and performance measures were evaluated. Confirmatory factor analysis is used to test the psychometric properties of the measurement scales and the hypothesized relationship between TQM practices and firm's performance are examined using structural equation modeling.

SPSS and Amos 20.0 are used to analyse the data.

4.0 Data Analysis & Result

From the results of testing the model of TQM implementation and organisational performance, it can be concluded that TQM implementation has positive effects on employee satisfaction, customer satisfaction, societal results and key business performance. Therefore, this research supports many findings from other researchers. It is not necessary to further discuss the effects of TQM implementation on organisational performance. Concerning the effects of the 12 constructs of TQM implementation on organizational performance, the following paragraphs provide detailed explanations.

1. Customer focus

The Structural effect of Customer focus on Customer satisfaction is positive (0.79) and significant ($p < 0.001$). Therefore, we have to accept the hypothesis that customer focus is positively related to customer satisfaction. As the competitive pressure of business environment is increasing, firms must emphasize on improving customers' satisfaction and expectation to maintain their current market share or strengthen their competitive edges. To this end, management level will focus on meeting customers' expectation while considering adequate operating strategy. In addition, the main goal of TQM implementation is to satisfy customers' need by providing quality products or services to them. Therefore, the authors can say that management level should take customers' requirements and needs into account when implementing TQM activities.

2. Communication

The Structural effect of Communication on employee satisfaction is positive (0.24) and significant ($p < 0.05$). Therefore, we have to accept the hypothesis that communication is positively related to employee satisfaction. As the communication between the employee improves that leads to better employee satisfaction.

3. Delegation

The Structural effect of delegation on Customer satisfaction is positive (0.74) and significant ($p < 0.001$). Therefore, we have to accept the hypothesis that delegation is positively related to employee satisfaction. Also the structural effect of delegation on KPR is positive (0.56) and significant ($p < 0.001$), therefore the effect of delegation on KPR is positive [H3b].

4. Continuous Improvement

It was interesting to find that continuous improvement has a positive effect on key business performance as well as societal results with structural loading of 0.48 and 0.49 respectively ($p < 0.001$). In this study, continuous

improvement means to establish a quality system according to ISO 9000 requirements. Undoubtedly, governmental policies and regulations have played a very important role in encouraging firms to implement ISO 9000.

According to the firms interviewed, most of them had increased their annual sales, market share, profits, sales growth, and exports since they received ISO 9000 certification. According to these interviewees, if they had not obtained certification, their strategic business performance would have been declining. ISO 9000 certification is a strong marketing promotion tool in India.

5. Results & Recognition

The hypothesis that recognition and reward has a positive effect on employee satisfaction was strongly confirmed by the survey data with structural loading of 0.84 ($p < 0.001$). Although Deming (1986) argued persuasively that the focus on individual performance and related evaluation and reward practices causes major dysfunctions and organizational ineffectiveness, the research conducted by Jenner et al. (1998) suggested that it is very important for having a successful TQM implementation in Indian firms if the contributions made by all employees toward TQM implementation is clearly linked to rewards. In fact, recognition and reward activities have been used extensively in various Indian firms for many years. All the surveyed firms had regulations regarding recognition and reward. These activities included, for example, public recognition, salary increasing, promotion, bonus, non-monetary rewards (spirit rewards). According to the quality managers interviewed, these recognition and reward activities did motivate employees to enhance their commitment. However, attempts to motivate employees through ideology and politics have become increasingly less effective compared with some years ago. The introduction of the contract system in most Indian firms means that their retained profits have become linked to economic returns, while employees' incomes have been tied to individual performance. A very high portion of employee income is dependent upon employees' performance. According to the respondents, the penalty schemes forced employees to follow regulations, especially low educated employees who were lax in work discipline. Otherwise, employees could not realize the importance of quality.

6. Leadership

The questionnaire findings revealed that leadership has positive effects on employee satisfaction ($P < 0.001$) and key business performance ($P < 0.001$) with structural loading of 0.62 and 0.56 respectively. If the characteristics of Indian manufacturing firms are taken into account, it is much easier to understand the important roles of top management in Indian firms. India is now trying to establish modern firm systems. Various firms (including state-owned) have received more decision making autonomy than ever before. Regarding day-to-day operations, the government has no direct administrative authority. Officially, state-owned firms are owned by "the whole of the people" whereas collective firms are owned by "part of the people". In fact, a firm's general manager is the person legally in charge of the firm under the Firm Manager Responsibility System. It is the role of top management to determine the firm's vision, strategy, policy, long-term goals, and the way to achieve these objectives. Top management is in charge of managing employees, motivating them to participate in quality improvement activities, encouraging them to share in the firm's vision, empowering them to solve quality problems, arranging resources for their education and training, and rewarding them for their quality improvement efforts. The experts indicated that top management is the most important factor leading to the success of TQM implementation and strategic business performance. Although most stated that employees' income was the most important factor affecting employee satisfaction, a few others indicated that employees being treated equally by top management was the most important factor for overall employee satisfaction. One interviewee said: "We do not want to ask more. We just want to be treated equally by top management." According to the results of interviews, leadership is the second most important factor affecting employee satisfaction. As a result, the questionnaire findings are consistent with the results obtained from the structured interviews.

7. Process Improvement

The hypothesis that process control and improvement has a positive effect on key performance result was strongly confirmed by the data with structural loading 0.57 ($p < 0.001$). The results from interviews also support this questionnaire finding. According to the interviewees, they paid much attention to process improvement in order to ensure that their products performed the functions for which they were intended to meet manufacturing and safety

requirements. They also stated that they adopted incoming, in-process, and final inspection in order to ensure that the finished products could meet the requirements of specifications. They used various quality tools and techniques such as statistical process control, the seven QC tools, and the PDCA cycle, which had positive effects on improving their kpr. Concerning process improvement, one problem was that their equipment was obsolete and sometimes could not meet production requirements. Much energy had to be spent on equipment maintenance. The other problem was that the work ethic was relatively undeveloped and skill levels as a whole were relatively low. Many employees still needed a great deal of supervision.

8. Supplier Focus

The questionnaire survey findings revealed that supplier focus ($p < 0.001$) has a positive effect on key performance results with structural loading of 0.68. According to Juran and Gryna (1993), poor quality of supplier products results in extra costs for the purchaser; for example, for one appliance manufacturer, 75% of all warranty claims were traced to purchased components for the appliances. Materials and purchased parts are often a major source of quality problems. Garvin (1983) found that firms that manufacture the highest quality products have purchasing departments that rank quality rather than cost minimization as their major objective. Conversely, in firms with the lowest quality performance, he found that the primary objective of the purchasing department is to obtain the lowest price for technically acceptable components. Newman (1988) suggested that a firm pursuing long-term relationships with suppliers can benefit from improved quality and process performance and continuous cost reductions. Flynn et al. (1995) stated that suppliers can contribute to quality performance in a number of ways. For example, selection of suppliers should be based on product quality rather than price, and suppliers can had. Leonard and Sasser (1982) reported that purchased materials and parts are a dominant source of process variability. Therefore, improving supplier quality management will contribute to the improvement of the firm's key performance results.

9. Team Work

The Structural effect of Team work on employee satisfaction is positive (0.34) and significant ($p < 0.01$). Therefore, we have to accept the hypothesis that team work is positively related to employee satisfaction. Also the structural effect of team work on KPR is positive (0.35) and significant ($p < 0.001$), therefore the effect of team work on KPR is positive [H9b].

10. Value & Ethics

The atmosphere in the organisation must be highly congenial to promote active interaction. There must be mutual respect and faith among employees. The Structural effect of Value & Ethics on Employee satisfaction is positive (0.57) and significant ($p < 0.001$). Therefore, we have to accept the hypothesis that Value & Ethics is positively related to employee satisfaction.

11. Work Culture

The Structural effect of work culture on employee satisfaction is positive (0.61) and significant ($p < 0.01$). Therefore, we have to accept the hypothesis that work culture is positively related to employee satisfaction. As the obvious case is better work culture will lead to better employee satisfaction as well as less employee turnover.

12. Strategy

Strategy that had been made mainly by top management and the questionnaire survey strongly confirmed the hypothesis that strategy has a positive effect on key performance results ($p < 0.001$) with structural loading of 0.59.

All of the firms had various plans such as strategic business performance plans, quality policies, quality goals, and quality improvement plans. In most cases, quality goals and strategic business performance plans were assigned by the administrative bureaus. However, these firms had their own objectives that were based on the plans from the administrative bureaus. Generally, top and middle management made these plans. On average, approximately 80% of employees knew their firms' vision and plan statements. Vision and plan statements effectively encouraged employees to work hard to improve product quality, reduce costs, and satisfy customers. Therefore, the results obtained from the questionnaire survey are consistent with real world.

6.0 conclusion

The research findings have some practical implications. First, TQM implementation has positive effects on overall business performance. Implementing TQM does payoff. Second, leadership is the decisive factor in determining the success of organizational overall business performance. In other words, without strong leadership, it is impossible for a firm to achieve good overall business performance. Third, the research findings can imply that it is not necessary for all the TQM elements to be present to ensure the success of the TQM programs and overall business performance. In other words, even if a few of the elements are not present, it is possible to obtain the required level of overall business performance. Firms should emphasize supplier focus in order to select suppliers on the basis of product quality rather than price alone.

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Appendix 1

Correlation between TQM Constructs and Results (Peoples')

S. No..	Item	(Correlations)
1.	Customer Focus	0.74***
2.	Communication	0.24*
3.	Delegation	0.74***
4.	Continuous Improvement	0.49***
5.	Results & recognition	0.84***
6.	Leadership	0.62***
7.	Process Improvement	0.43**
8.	Supplier Focus	0.92***
9.	Team Work	0.34**
10.	Value & Ethics	0.57***
11.	Work Culture	0.61***
12.	Strategy	0.51***

*p < 0.05, **p < 0.01, ***p < 0.001

Appendix 2

Correlation between TQM Constructs and Results (Clients')

S. No..	Item	Correlations
1.	Customer Focus	0.79***
2.	Communication	0.35**
3.	Delegation	0.69***
4.	Continuous Improvement	0.47***
5.	Results & recognition	0.82***
6.	Leadership	0.64***
7.	Process Improvement	0.42**
8.	Supplier Focus	0.80***
9.	Team Work	0.52***
10.	Value & Ethics	0.58***
11.	Work Culture	0.54***

*p < 0.05, **p < 0.01, ***p < 0.001

Appendix 3

Correlation between TQM Constructs and Results (KPR)

S. No..	Item	(Correlations)
1.	Customer Focus	0.63***
2.	Communication	0.27
3.	Delegation	0.56***
4.	Continuous Improvement	0.48***
5.	Results & recognition	0.64***
6.	Leadership	0.56***
7.	Process Improvement	0.57***
8.	Supplier Focus	0.68***

9.	Team Work	0.35**
10.	Value & Ethics	0.68***
11.	Work Culture	0.58***
12.	Strategy	0.59***

*p < 0.05, **p < 0.01, ***p < 0.001

An Objects-First Approach to Teaching Software Development: A novel instructional framework

Gurdeep S Hura

Professor, Department of Maths and Computer Science, University of Maryland Eastern Shore, Princess Anne, MD

gshura@umes.edu

Abstract: - Software development (SD) a subset of software engg is used for the design and development of software applications. In most of software engg courses being taught at various universities we teach introductory modules in SD using a procedural paradigm and an imperative language. We teach SD using procedural approach that addresses a number of issues dealing with the basics of programming, but the principles of programming can't be taught as there are many inherent issues that are not discussed in this approach. Many aspects of software quality that needs to be addressed during the modern software design process. Recently we introduced one of the most important of those aspects in the software quality as software evolvability that can be defined as level of easiness with which a software system can be modified to meet the future requirements. In this paper, we extend some of the concepts presented in our earlier paper and propose an object-oriented approach for teaching SD using top-down learning method of developing software. The proposed approach is based on the concept of introducing functions and basic modules as building blocks for the design and development of software. In other words, the students will learn to write program written in a form similar to pseudo as sequences, selections and iterations of given functions and using these, students will be able to develop their modules using the basic constructs programming language with some reasonable software quality . We also present the issues concerning the choice of programming languages and outline a complete scheme for teaching the process of SD.

Key-Words: - Software engineering, Software development, Programming, Teaching.

1. Introduction

Within the software engg course, software Development (SD) deals with the design and development of software applications and it includes user requirement analysis and rigorous testing to ensure that the final product conform to clients' requirements [1, 2]. It may also involve formal specifications and formal methods if the application is large and complex. A course on Software Engineering (SE) and other programming-based subjects usually discuss basics of programming-in-the-small where students learn a simple software design method, basics of a computer language, integration of various components and method of testing. The focus of Software engg centres around the program specifications, and as such less emphasis during the software development is provided during the system requirements and the analysis.

A course on software engg should enable students to gain the necessary knowledge and acquire the appropriate experience in the design and development of software applications. Although sometimes, teaching a course like this may look difficult, but if we design the curriculum in such a way that it offers various steps of design and development using top-down approach, it may help the students to gain the necessary experience in the software design and programming skills. If the course is well designed, properly delivered and students show commitment and work, as they should, then the task becomes somewhat easier. However, being proficient in a programming and development skill is a function of time and the time available on a degree or diploma programme is simply not enough. Thus, it is essential that the course should focus on the design and deep understanding of practical elements of an SE and other programming-based programmes of study with great care and ensure an effective delivery.

Programming-based courses at educational institutions normally start with an *introductory programming* or an *introductory software development* module, right at the beginning of the course and as such this paper focuses on

the teaching of such a programming module needed for the design and development of software development of software application.

In the recent years, IT industry has encountered the problem of evolving software system. A software system should be evolved in order to compete with the similar product in the market. To stay on the market, software systems should inherit new requirements, so that they could be able to adapt themselves to the changes occurring in the environment. However, current marketing trends do not allow industries to work on the newly emerged requirements for a long time period. So the need for easily evolving software systems has emerged and software evolvability has gained significant importance as software quality attributes in the software development and enhancement [6-8].

Studies have shown that software maintenance is the most expensive as well as longest phase of the software product life cycle. Once the software has been developed and launched, it requires modifications in order to meet the future requirements. Greater the evolvability of software system, less the cost is required for modification to meet the future requirements.

In this paper, we first discuss the traditional procedural paradigm method for SD and then highlighting the weaknesses of this method. We will introduce object-based approach for teaching of various aspects of SD. Further, we will also discuss issues concerning the choice of first programming languages and present our conclusions.

2. Software Development Paradigms

There are several SD paradigms including imperative, object-oriented, functional and logic all of which are taught on a computing programme at different levels. For the teaching of SD in Software engg course, it is the procedural or imperative model that is most popular, even when the language used is an object-oriented or object-based. This approach is highly compatible with von Neumann architecture of today's computers and also is being supported by third/fourth generation procedural programming environment. It is natural and simple for the students to decompose the software Engg. project into a set of procedures instead of objects.

2.1 Procedural Programming

In teaching any programming language, we usually have two courses and use bottom-up approach (syntax and semantics) for offering it. Further, the advanced concepts and other features taught during these two courses typically depend on the programming language chosen. We usually give emphasis on learning a language and not on the modelling of realistic computational problems. In teaching of any these courses, teaching of the basic concepts of programming language includes the discussion on the following topics in one way or the other:

- General program structure
- Declarations and Variables
- Input/output and Assignments
- Iterations and Selections
- Arrays and Records
- Functions and Procedures
- Other features of the language

In addition to learning the syntax and semantics of a programming language, students also need to be familiar and enough experience in the workings of the language environment, often called *interactive development environment* (IDE). Students are expected need to know the use of the IDE even for a small program, use of the editor to input and edit source code and use of the compiler system to compile, link, build and execute their programs. Furthermore, the students are expected to have an understanding of the system and other diagnostics including syntax and runtime errors, all of which adds another layer of difficulty to the learning process. As Dehnadi and Bornat [9] put it: *Learning to program is notoriously difficult.*

Thus, after taking both the courses of programming language, students are expected to have sufficient knowledge of all the following:

- Basics of a design method
- Syntax of necessary declarative and other functional statements of a language to convert design into program code
- Procedures for entering, editing, compiling, linking and executing the program
- All other procedures such as starting the IDE, getting into the language system and closing the project.

The design method of software is usually taught using function-oriented methods and object-oriented methods. Teaching software design using *functional decomposition* or *stepwise refinement* seems relatively easier but teaching the same using well established formalized method requires students to learn and practice an additional skill at the same time as learning a language and its environment.

Thus, in summary, when we teach software engg course, we may have a difficult task in the couple of weeks teaching the basics of design methods as we expect the students to learn these concepts in the beginning of course. If it is not taught properly, students may lose their interest and confidence and the purpose of teaching the course using this approach may be defeated and the project may not be completed.

Further, the software design using engineering approach seems to be a difficult process and may not be applicable during the design of software applications as the emphasis is not mainly on the use of engineering approach but expects students to use their skills for the design and development of complex systems. Also, we find that the course team are so busy teaching the essentials that the approach does not leave much time for teaching or learning documentation, quality, professionalism and elements of good practice.

In order to address and solve some of the issues in the existing techniques, we propose a new design method as an *objects-first* approach in the following sections. Some of the features of this approach include: modularization, encapsulation, reusability.

2.2 An Objects-First Approach

In this approach, we define modules and functions and using these as building blocks, we define other interactive modules whenever possible using these to model and design the entire software application. This approach is highly structured one approach and is being supported by the features of *modular programming* where use of modules and functions establishes the principles of code *reuse* and *functional independence*. In other words, it is quite obvious that the emphasis of this approach is centred around on features like modularisation, encapsulation, recursion and reuse. This contrasts sharply from the traditional procedural approach where modularity, functions and recursion are being taught much later in the course and as such students do not see the real advantage of these features in the software development of applications. The following section discusses the application of such an approach in software development process.

3. Software Development using Objects-First Approach

To implement an engineering approach to software development, we propose an Objects-First Approach to Procedural Paradigm. Our model is loosely based framework and regards the construction of software as an engineering activity. In this framework, as stated above, the modules and functions are the fundamental building blocks for the software development and help to produce properly structured and good quality modular software. It is a top-down approach where the important concepts of object technology and principles of engineering are introduced at the beginning of semester of the course offering.

In the proposed approach, we first establish a library of functions on a suitable topic (e.g. graphics) prior to the delivery of the software development (SD) module. While teaching this method, we teach our students to write their programs as sequences of given functions and procedures where students will consider only the external behaviour of these functions. Building programs in terms of functions will help students to understand the concepts and use of features like modularisation, reuse and encapsulation mechanisms, without knowing the intricacies of the computer language.

It is important that students are able to successfully execute their programs early on in the course. This provides a sense of achievement and increases students' confidence. After successfully running a number of simple programs and understanding the basics of the language environment, programs are written as selections and repetitions of the same

functions. Use and practice of these techniques help in teaching the students the general syntax of selection and iteration statements of the language. After gaining this kind of experience, students now can experience the importance of modularization, reusability, mechanisms for reducing software complexity, incremental development, polymorphism and overloading of functions through the library of the functions that can be created by the students.

Students who come this far are now ready to learn the syntax of input, output, assignment and other basic statements of the language for producing 'real' programs. This is the time to practice functional independence, quality, code readability, maintainability and other elements of good programming style.

Now that students have the necessary practice and knowledge of the language, they can begin to 'problem solve', design and build their own programs from given specifications.

In an introductory SD module, the focus should be on problem description and problem solving strategies. We suggest that the design technique be a simple one so that students do not feel that they are learning an additional method - *Stepwise Refinement* [7] is a perfectly acceptable approach. Although, students will learn by producing their own programs, use of good quality, well-structured and properly documented worked examples will greatly advance the learning process.

3.1 Teaching Strategy

We now outline a teaching plan based on the above model. We assume the module duration to be twelve weeks and suggest four hours per week of contact time including lectures, tutorials and practical sessions.

During the orientation week just before the start of semester, the teaching team are required to create a library of functions on an appropriate topic e.g. graphics. This requires a certain amount of investment of time and effort but there is no need to create an extensive library. As an example, two such routines might be LINE and CIRCLE: one to draw a line of a given length in a given direction starting at a given point and the other to draw a circle of a given radius at a given point.

Once the students have been exposed to these two routines, we now can introduce the IDE and get students to familiarize with the editor. We can give a simple working program to the students who can enter and execute to understand the compiling and execution process. At this time it may be a good idea to introduce a programming language and its structures to the students so that students can understand the concept of structure programming.

We can now spend about two weeks to introduce the concept of functions and modules that will help the students to use for defining the system. Now we can explain the purpose and use of library routines LINE and CIRCLE. We also discuss the significance and meaning of required parameters and use of argument lists and give simple program to the students to understand the calling of functions in a sequence. We may ask the students to draw objects that have straight lines or circles. For example, for straight lines, we may ask them to draw a chair which contains straight lines while for circles; we may ask them to draw a table. To understand the concept and implementation of functions LINE and CIRCLE students will use these in their programs.

Other features of programming language like stepwise refinement, selection and iterative statements can be taught in next two weeks where they will use these constructs for the design of programs. We can make them write more complex program that may include a number of rows of chairs or tables and also surrounding chairs or tables. The stepwise refinement process can be used to define /provide pseudo code. .

After having experiences with stepwise refinement, selection and iterative statements and their in writing and designing complex programs over half of the semester, now, we can introduce various modern features of software development process like modularity, code reuse, functional independence and other engineering principles. We also need to explain the advantages of incremental development and benefits of producing proper designs and test plans. In order for students to get into modern software development, the programming experiences with these features and constructs, students will realize the benefits of using appropriate standards, developing quality software, keeping accurate records and producing proper documentation. Now the students will experience how they can appreciate how the modules they used in earlier programs (e.g. LINE and CIRCLE) represented objects and classes and that they will

be using these to create new objects (chairs and tables). It is important to know that using this approach of teaching software development, it is not intended to explain the basic concepts of object technology but we introduce the basics of terminology the syntax and use of input, output and assignment statements of the programming language.

We may give more examples of programs to the students in next two week to get more insights of these concepts and hands-on experience in the design and writing of their own functions, objects, and development of modules like chair, table invoking functions like LINE, CIRCLE and a number of LINE functions. .

For remaining weeks, students will be working on a number of complicated programs and practice on these concepts that they have learnt during the first three quarters of the semester. Here students can learn windows-oriented programming, if using a language such as VBasic, C# and Java [9-11]. We may explain advanced features of the language and other engineering concepts. Students will be able to appreciate the differences between programming of small and large programs. Re-emphasise the advantages of incremental development and benefits of producing proper designs and test plans.

3.2 Summary

The main contribution of this paper is present a new teaching strategy for teaching Software Development within Software Engg course sequence. For understanding the process of SD, the teaching of programming language should follow the following sequence:

- Creation of modules from library and graphics
- Program structure and program layout
- Use of libraries and sequences of statements
- Functions, procedures and parameters
- Selection and repetition statements
- Input, output and assignment statements
- Data structures: arrays and records
- Advanced features of the language.

The following section describes the criteria for choosing appropriate programming language for teaching a course on SD within Software Engg course sequence

4. Programming Languages

The primary objective of an introductory SD module should be to teach the principles of programming. In this respect the choice of a language becomes irrelevant [6]. However, the teaching team need a language to illustrate the principles and provide practice of SD. Choice of the language, then, depends on the programming paradigm employed. Since, procedural programming is the most favoured approach; first languages tend to be mainly procedural. However, object-oriented, object-based and visual languages (e.g. C++ and VBasic) can also be used for procedural programming (i.e. for *console applications*). A declarative language that is based on logic and functional programming paradigms can also be used for teaching SD and in fact, it is being used in some institutions [3].

It is often suggested that a first programming language to be used for teaching should be well structured. Experienced instructor should be asked to teach this course as he/she can make it very easy, learn and use the programming language for writing programs [6]. Whereas, this may be acceptable for programming-in-the-small, when teaching principles of engineering and elements of good practice with a view to producing complex software, the criteria is not sufficient. Since choice of a language depends on a number of factors such as programming and design methods, we need to extend the criteria mentioned above into this choice to make it more effective and useful. Thus, we may use the following characteristics that should be considered for the selection of first programming language to be taught to the students during SD. Thus, the programming language must possess the following features

- Small, simple and must be powerful
- Strongly typed and block structured
- Procedural with capability of extensions to implement object technology

- Inherent capabilities to implement engineering principles and concepts
- Industrially relevant.

The simplicity and small size of programming language imply ease of use, ease of learning and debugging. Power of the language provides its ability to deal with complex problems as well as simple ones. Strong typing reduces debugging problems and block structuring helps to produce structured and modular software. Features to implement object technology and engineering principles are essential when implementing object-oriented approach or a model similar to the one suggested in this paper. Industrial relevance is important for the reasons of students' employability, later.

Fischer [3] suggests the following criteria for the programming language choice:

- Powerful enough to demonstrate the programming concepts
- Easy to learn
- Not error-prone i.e. get running fast
- Easy to use development tools
- Well supported by ways of availability of library functions.

Currently available languages such as VBasic, C# and Java [8-10] are all highly suitable first languages for an introductory course in SD.

5. Conclusions

A course on Software Development within Software Engg can be taught using any method but procedural paradigm seems to be most popular, traditional and favoured approach for teaching a first course in SD. It is based on imperative language and follows bottom-up and syntax driven approach. This helps the students to learn not only the syntax and semantics of language but it also allows them to learn its environment. If a formal design method is also taught at the same time as the language then students can get so overwhelmed by the amount of learning that some may lose their confidence and get disappointed with the learning experience. Also, the traditional approach teaches programming the students with more emphasis and practice on writing the code and does not teach the SD to the students as an engineering activity that requires the engineering approach the design of SD.

To resolve the inherent issues in the traditional approach to teaching SD, this paper suggests an objects-first approach to procedural paradigm. This is a top-down approach, which regards functions and modules as the fundamental building elements for the construction of software. The emphasis is on modularity, code reuse, practice of engineering principles as well as quality, standards and professionalism right from the start.

We presented a systematic method of teaching that can be used as a basis to construct a first course in teaching software development.

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Business Complexity-Influence on Sustainability

1. Prof Jaikumar Kulkarni
2. Dr Sandeep Pachpande
ASM Group of Institutes-Pune INDIA

ABSTRACT

The Business World today is troubled by the inertia in the system which is due to the complexity that each business has itself created over the previous few years or decades .In view of the market opportunities and the corresponding threats to business survival, since the time the globalization of business, every major player has under taken to expand its business through new product launches and through inorganic business acquisitions(M&As).and entering in to hither too un touched, un known market segments both in domestic & global markets

,This has necessitated multi product, multi locations, and multi market segments, multi cultural integrations, multiple management practices resulting in to a highly dense cobweb of business complexity. This severe complexity has been restricting creativity and innovation based progress since all the major resources of the organization are busy& preoccupied in resolving issues arising due to organizational complexity management.

It is a matter of fact that major global organizations are now busy clearing the ‘complexity-mess’ they themselves have created in the recent past- through establishing cross functional teams to meticulously unwind the complexity cob web. Unless this complexity management (reducing complexity) is done on top most priority the business houses will face their being left out of the volatile global markets.

This paper attempts to explain various areas of the business which are saddled in the complexity conundrum and while developing a cause- effect correlations between actions taken by the business and the resulting complexity. Also an honest attempt is being made to recommend certain quick- fix recommendations for alleviating the ‘drag’ due to business complexity. The case studies & examples included in this paper are based on the author’s personal experience during his near 40 years of industry experience in India and abroad and the narration is based on the situations which existed during these years. However, wherever possible due care has been given to the changing business strategies adopted during the past decade by the industries in general to compete in the globalised market scenario.

The scope of the paper is restricted to business organizations in the public domain and therefore issues of complexity in the general environments such as economic upheavals due to national & global economic policies are kept outside the purview of this paper.

The observations made in this paper are author’s personal views and are intended for the purpose of narration of main theme and therefore there is no implicit or explicit intention to criticize any individual or an organization.

BUSINESS COMPLEXITY- (B-COMPLEX)

The Nature and Type

Business complexity is considered as an issue if there is a loss of rhythm in the business processes, causing undue delays in delivery commitments, in making business decisions, loss of efficiency at crucial phases in project management, unobservable mix ups in materials management & logistics and resulting in noncompliance to product specific modifications due to regulatory norms etc.

Normally in a single product & few clients situations the decisions are expeditious and commitments to cost, quality & time are manageable. But when the business enters in to multi product, multi market segments, with product mix and market mix issues needing appropriate planning and scheduling techniques, there is a tendency to provide for commonization/standardization of raw materials, processes, logistics, product/process costing & pricing, including clubbing of functional responsibilities .In this process there appears a tendency towards lack of alertness in avoiding the very genesis of complexity which later hits back as challenges/hurdles in the smooth flow of major business processes.

There are different types of business complexities depending on the nature of & the size of the business expanse. This of course has to include all the stake holders and their interests in the main business. The understanding and analysis of business complexity calls for a very detailed review of the business processes including the very purpose of the business when it started its operations and the subsequent iterations carried out consciously or unconsciously over a period of time. The ever dynamic business environmental factors and awareness or the lack of these changes in relation to the path followed by or decisions taken by the business leaders at different times will be of major help in understanding, the beginning and the current status, of business complexity. The more the continuity of the stake holders in a particular business the more easier it will be to find out the root causes of the business complexities.

On a very broader scale we can classify the types of business complexities as:

1. **Business economics** related.
2. **Technological changes /interventions** (both in products& processes)
3. **Social needs related** (The influencers on the business environment both inside/outside)
4. **Regulatory& Corporate Governance&CSR obligations**
(Environmental controls, trade and tariff barriers Corporate Governance& CSR interventions etc.)
5. **stakeholders' interests/demands.**

We may now decide to study each of the above aspects w.r.t 'Complexity Management.'. However we have to keep in mind the overlapping effect between the above facets of business complexities to avoid confusion in the appropriation of each one as 'causative.

1. BUSINESS ECONOMICS COMPLEXITY (FINANCIAL)- (F):

This includes all the aspects of the business which aim at maximizing its ROI right from launch of the business enterprise to every phase of the 'Life cycle' of the business entity, and the strategic decisions made and implemented towards sustenance of business and its economic interests.

In the normal terminology by business economics we mean the way in which a business manages its economic needs and results, it includes management of capital costs, margins and its investment requirements in the economic terms.

In the initial stages of a business venture, the conversion process of a business idea in to a commercially beneficial project and arranging for all the capital requirements in this process take priority over other long term perceptions. Preparations of truthful viability projections and sincerity of purpose in the implementation of the business proposal to a great extent help avoiding 'slippages' on the way to project implementation.

However the entrepreneurial anxiety, and the fear psychosis of likely delays affecting the project tend to force the businesses to bend backwards and cut corners on many aspects from product design to customer relations. This is obviously the point from where onwards the strategic drift and the seeds of business complexity are sown in to the organization. In the embryonic stage itself the congenital deformities start appearing in the otherwise healthy entrepreneurial venture. In order to get rid or to avoid the red tape the sacrifice of 'Values' becomes a prerequisite.

As the organizational life cycle status shifts from the embryonic stage to the 'toddler' situation, the urge to excel or grow after the gestation period the business is tempted to explore ways to grow its financial muscles by investing further in areas which are in conflict with the competitive forces.(Michel Porters 5-forces Model of competition).The demand on the economic feasibility are very severe at this stage any wrong habit inculcated at this stage in the financial management of the operations of the enterprise may lead to catastrophic consequences for its long term survival.

The closures of many businesses at this 'pickup' stage is seen so obviously around in any Industrial estate, anywhere in the world as a consequence of adopting incorrect ways of handling the economics of these ventures. The near graveyard situation of SMEs closing shops at most of the MIDCs is an indication of failures of the concerned entrepreneurs in managing business economics complexities confronting the businesses.

As the industry grows to the stage of stability (Incase it is successful in negotiating the hurdles of business complexity at the growth stage), there are major responsibilities towards 'Business Sustenance' amidst management of growth through both organic and inorganic means. This is where the realistic 'Competitive Capabilities' of the business are put to acid tests. This where factors such as 'catch up fast' 'Make Hay when the Sun shines' start working seriously on the minds of business leaders.

Aspects such as maximizing market share, business growth thro' acquisitions in both related and unrelated areas, diversifications & expansions, conglomerate integrations etc are at the top of the agenda for the strategic planners of the business enterprise. While this hectic is understandable at the growth stage of the enterprises, hasty and uncalculated risk factors, including over or underestimation of the business 'Drivers and its Critical Success Factors' lead to serious regrets and business complexities at later stages of implementation of these growth strategies. There will be serious drain/strain on the economies of the business due to unmanageable borrowings, and difficult to manage market forces. The ever increasing rates of failures of business mergers and acquisitions (The success rates of M&As, across the globe are around 20-25%max) are indicators of unsound business decisions, unforeseen complexities in manageability of the merged entity.

The not so distanced examples of the economic meltdown and catastrophic scandals and 'lost sight situation' in globalised market economics, such as the famous sub prime lending, The Lehman Bros. the sinking Euro Countries economics. The rising state level debts, due to bailout supports, are again reminders of 'Things Gone Wrong'(TGW) basically due to lack of clarity and foresight in to the complex nature of global business.(the B-complex Effect)

2. TECHNOLOGICAL CHANGES-COMPLEXITY-(T)

Now let us look into the unfathomable nature of Business complexity due to Compulsory and voluntary aspects of technological changes brought about in the Product and Processes of business paradigms including the regulatory requirements of environmental protection, and other social and neo political reasons asking for Technological Changes in the Product & Processes in Business situations

.There are basically two types in the Technological Changes

1. The Induced Change (The normal/natural Change)

2. The Compelling Change (The forced change to ensure survival against competition/consumerism)

The changes in the technologies of products and services due basically to increased awareness of natural resources, and improvement due to scientific researches innovations and discoveries in all aspects of life on the planet Earth can be classified as Induced technological changes. The changes leading to improvements in the longevity of life and better processing of the natural resources, leading to better quality of life and the related changes in the understanding level of the surrounding habitat and similar could be grouped as Induced changes.

So far as these efforts lead to meeting the basic needs of food clothing and shelter and even to some extent of the social, hierarchical & self actualization needs, the changes are within the Induced change category. Each of these induced changes could be graded as Ethnic-Traditional –Conventional –Contemporary types of changes. The transition from one stage to the next level of changes, besides the absolute necessities, certain changes which were purely linked to social status & competitive advantages may have induced complexities, leading to detrimental or side effects which call for rethinking and redressal of original performance parameters and in- gradients of the products & services. The fat free food, emission controls on automobiles, restriction on certain medicinal formulations etc, are indicators of such alterations leading to complexities in the purpose of business and steps taken which may not necessarily avoid the detrimental effects of such products and services.

The compelling Type of Technological Changes have in majority focused on areas of personal consumptions and social status needs . The advents in fast foods, cosmetics & fashions, the personal ward robes, the 'buy /avoid me if you can' type of temptuous products & services, the various social media related communication techs, have created compelling needs for products &services which even though create convenience/comfort feelings in life, are likely to create conflicts & confusions between the natural instincts & compulsive instincts of need satisfaction. Today the permissive & promiscuous ways of life in so called super advanced societies are also the promoters of crime, violence and terroristic tendencies all across the globe. These compelling technological overtures have also lead to newer diseases, & epidemics, and created competition between the obviously detrimental V/S the life supportive products & services, While in many instances it is the the first to market & basic survival necessities for business ventures to innovate new products & services, it is this greed or fear which is the originator of many complexities in managing businesses drifting far away from their original business purposes & the honest generic strategies.

The above two types of technological changes are very broadly seen as perpetrators of to days' agonies and ecstasies in our societies around the world. And the speed & spread of these maladies is facilitated by advent of faster modes of communication & commutation .May be we have lost track of the very purpose of life on this

planet, and find ourselves busy in being a proud member of the otherwise 'man eats man' kind of complex business purposes and priorities, drifting endlessly in self-supportive visions of progress and prosperity. We may for the sake of our discussions name these technological changes as TC.

3. CHANGES IN SOCIAL ORDER-COMPLEXITY:

These types of variations in our social strata are basically due to 1. Demographic changes (Demographic dividends) .2. Cross-cultural infusions in search of newer and newer market segments for products and services. 3. Exploitations of natural & man-made resources for ego (under the garb of social emancipation) satisfaction based on greed and need satisfaction.

The aspects of demographic changes over the centuries have been basically due to commercialization of geographically strategic vantage points (demographic dividends). This of course has been the main reason for the disguised sense of open market approaches of several focal locations. Even though this initially appeared like a great opportunity for cross-cultural interactions, it has resulted ultimately in grossly compromised and constrained social order. People who migrated for the sake of opportunities for higher education and brighter careers to so-called developed countries, invariably experience and strongly feel the absence of social support in these countries to which they migrated basically in search of happiness & are never accepted as original but second-class citizens of the host countries. These same people, disillusioned for the sheer lack of sense of true belongingness, are trying to correct their steps too late in time by wanting to return to their ancestral societies, but face greater difficulties since their allegiance to alien cultures and pathologized social behaviors, compelled by the forces asking for compliance to foreign and definitely not so homely social environments. Today in almost all nooks and corners of the globe we see hundreds and thousands of people having lost their originality and fellow feeling. They feel absolutely insecure due to lack of ownership and welcome by their own ancestral social groups. There are millions of parents who feel the absence of their sons and daughters who stay far away in alien societies, feel like orphans at the later stages of their life. Every thing in their interactions with such long-distanced relations looks artificial and full of doubts and pretensions.

Now the cross-cultural interactions or integrations, as much spoken about & lectured as signs of social progress, are manifestations of false assurances of well-being, purely motivated by commercial & business considerations. However, any one can try to claim optimizations of cross-cultural interactions; it is a matter of fact that all aspects of measurements of such an integration are attempts to browbeat the mere undercurrents of situational adjustments and not in any sense cross-cultural integrations. At the core, every one feels alienated from his free will behavior, sense of loss of touch with his/her origins. This is a reality, and such societies are brimming with sense of discontent which the social psychologists for their business needs attempt to superimpose with lectures & research papers claiming that all is well, with societies where in heterogeneous cultures are conditioned by circumstances to stay and work together. The ever-escalating fights for rights to free will behaviors and demands for equanimity in social order & social strata, culminating in terrorism, Naxalism, Fundamentalism, are few examples of disturbance and complexity in the societies all across the globe today.

The aspects of Creativity & Innovations leading to discovery of newer products & services when driven purely by business & commercial considerations without much attention ultimately to improved self-esteem and feeling of real progress by the societies, lead again (Exceptions could be Innovations in the field Medicine & Health Sciences) to promotion of consumerism, false sense of social status, and further alienate the haves from the have-nots. The bitter wars on the business front in the fields of social media & net working are examples which will make the common man run crazy & bewildered, due to complete break-down in human relations and cultural fits. Today due to compulsive marketing forces enabled by higher compensation levels, nearly 80% of the energies of the societies are focused on looking good rather than feeling good. And the balance 20% of the energies are spent in regaining the lost balance and peace of mind due to wanting to be socially acceptable (The elite complexity).

4. REGULATORY, CG & CSR OBLIGATIONS PEOPLE PROCESSES-COMPLEXITY (P)

As an after-effect of the atrocities happening due to quest for business survival, we tend to deplete the intrinsic supportive and protective aspects for life on the universe. Over the previous several decades in our quest to speed up social & business contacts and communication, with thorough disregard to the environmental limitations, have rendered life on this planet vulnerable to extreme climatic changes & unpredictable catastrophes all across the

globe. Perhaps there has always been a short sighted commercial approach to all the product & process Innovations, in all walks of life. Today we are frequently confronted with situations which could have been avoided incase a real long term impact on our lives and the planet was factored in the Innovations& their implementations.

We see near chaos all around us for environmental degradation, fear of unmanageable dangers of nuclear energy ,the escalating fuel & food scarcities ,near extinctions of useful flora & fauna, uncontrolled consumerism leading to debt crisis putting countries and nations at the risk of loosing their sovereignty and existence. plagued by indiscrete terroristic strikes and kidnaps, the drug mafia, collapsing social values etc.

There is therefore an extraordinary effort in bringing about regulations and restrictions by the global economic super powers to contain the damage and resurrect certain orderliness all around. These regulatory controls lead to self protective behavior which work as obstacles in smoother implementations of the regulatory norms prescribed.

An escapist route against such norms leads to corrupt practices to counter the regulations. Non compliance to financial norms lead to sudden collapse of fiscal discipline(The Lehman bros & The subprime lending fiasco). Non compliance to environmental control norms have lead to the erratic climate Changes and the danger of the green house effect which may lead to serious health problems to life on the planet earth. The loss or extinction of various life species is a clear indication of erosion of life supporting environment for these species on earth. This has lead to complexity in the basic life cycle & survival of all forms of life. The fight for territorial controls to secure ones own interests has manifested into civil wars in many countries basically triggered by interested powers to retain or gain control on scarce resources such as crude oil, navigational nodes etc. The web of monopolistic controls is being spun around such commercially strategic locations around the planet by the super powers for selfish needs.

5. ALTERED STAKEHOLDER INTERESTS& DEMANDS- COMPLEXITY

This one of the main aspects or factors leading to the Creation. Nursing, and supporting the ‘Complexity’ over periods of false evolutionary aspirations of the vested business interests. Whether consciously or unconsciously, organizations have created complex situations in all their efforts to maximize stakeholder interests. Of course the role play is not that easy for any business, attempting to survive in business mainly by ensuring stake holder satisfaction. It is akin to the role played by the Ring Master in a circus surrounded by hungry lions and tigers in the form of stakeholders, and to make them behave less violently and maintain semblance of order is always a difficult task for any entrepreneur.

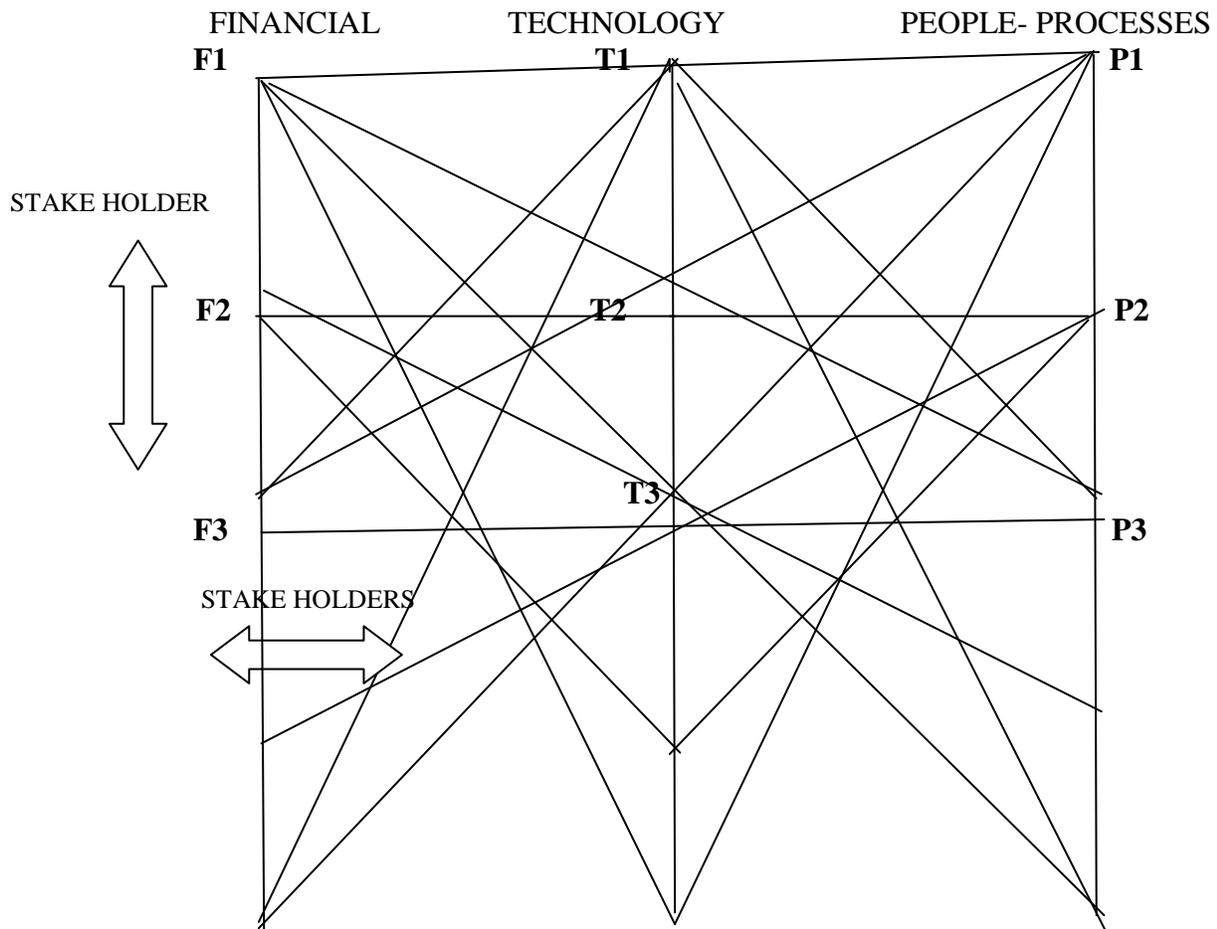
Businesses are compelled by the constant threats in the environment, to find out short cuts, which even though in the long run are ruinous , and complex to mitigate consequences are essentials to ensure stability however short term it could be. The products & processes adopted to meet customer needs both in performance and affordability terms have given way to disastrous complexities of environmental degradations, health hazards, malpractices such as hiding the risks of usage etc, corrupt approaches to subdue impacts of scandalous practices in financial & quality of services, have left every stake holder severely abused and bruised with unseen prospects of comfort feels.

Every stake holder wants at any cost his pound of flesh in the booty of business efforts starting from the promoters, to the shareholders ,the financiers, the vendors, the employees, the customers, the competitors, the society , and the governments constantly weave the web of complexity in the management of business. At times it becomes difficult to assess/trace the founding ethos of businesses which today are sunk deep in to the rut of unethical ways of business conducts.

6. BUSINESS COMPLEXITY MATRIX:

In the following diagram an attempt has been made to represent a complexity matrix based on **Three Points Scale** of severity & on **three major aspects** which influence business complexity both at domestic and international business .On a severity scale of 3 the matrix tends to explain the nature of business complexity on an interactive process of aspects of Business Economics, Technological Changes, and Regulatory and Corporate Governance interventions. There could be many related/unrelated aspects such as political & economical policy frame works which also influence business complexity. However in order to avoid conflicts in understanding the matrix and resultant confusions the author has decided to consider only these three aspects within the scope of this paper. As one could see the matrix allows the readers to observe the important Nodal Points in the Matrix which help

identifying crucial stages in the business at which the complexity dimensions can be measured and evaluated for steps for the reduction of business complexity, which pose as risks and threats for sustenance & growth.



Note: It is necessary to conduct a detailed & relevant business environmental analysis before approaching the above matrix type of evaluation for specific business complexity. ©This is basically to avoid assigning higher weight ages to issues which are situational and subject to the dynamics of issues of political & economical policy related aspects of both domestic & global happenings.

7. SEVERITY RATING OF BUSINESS COMPLEXITY

Business Economics Related Complexity-(FINANCIAL COMPLEXITY) ‘ F’

F1 – Highly Severe : Severe pressure on current Ratios of Business, Multi Creditors, Multi Debtors, Multi Types & sizes of Investments, Inventories, Non Performing Assets, Non value Adding assets & operations, complex Market forces, Complexity due to JVs, M&As, Complex Corporate Governance requirements.

F2 – Moderately severe Complexity

F3 – Manageable& Short term complexity

Technology Related Complexity- ‘T’

T1- Highly severe technological complexity – Product , Process, Operational, Marketing Severity of competition on technical aspects of performance & quality (Highly Differentiated Terms of product acceptance, Technology obsolescence speed & nature.

T2 – Moderately Severe- Needing further Investments in R&D etc

T3 - Manageable Severity- Conditions on time scale manageable with some additional efforts.

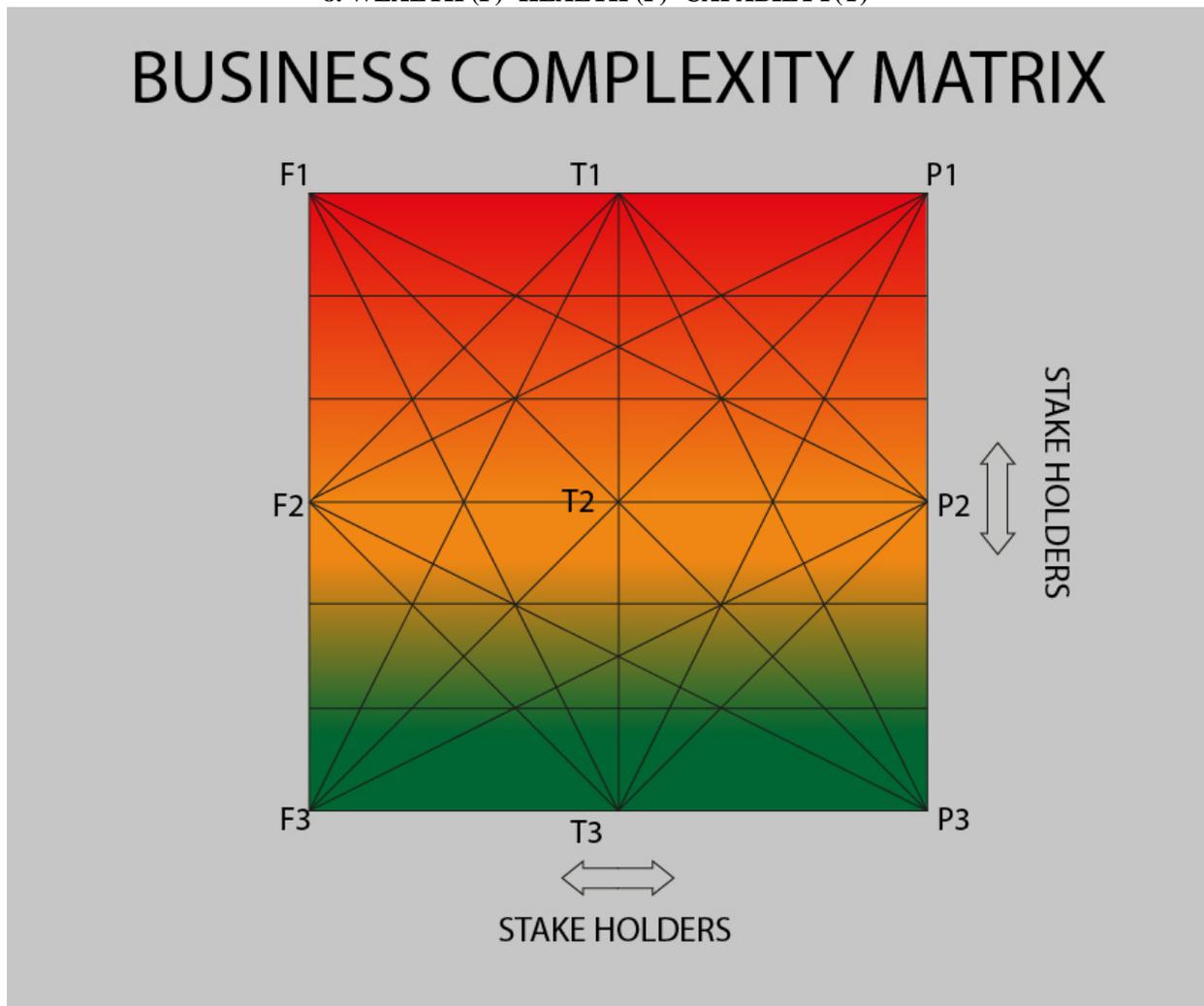
Regulatory/social/Corporate Governance Related Complexity- people& Business-process related—‘P’

P1-Extremely severe regulatory requirements arising out of Environmental Control obligations, Situations creating social uproar against business continuity /expansion, stricter Conditions due to Corporate Governance Norms and business regulations restricting Mergers & Acquisitions, Investments in Foreign Countries due to economical sanctions & regulations.

P2- Moderate Complexities of regulatory and similar restrictions which can be resolved by persuasions & plead.

P3- Time bound conditions & restrictions due to economic/social reasons

8. WEALTH (F)- HEALTH (P)- CAPABILITY(T)



Red: Severe complexity Orange: Moderate Complexity, Green: Normal Complexity

CONCLUSIONS

The above matrix can be used to conduct a port Folio analysis of Products ,Businesses, Critical Success Factors,& Business Drivers in a Competitive Global Business Scenario, to analyze and arrive at appropriate strategies to address business complexity issues.

Implementation and usage of Business Complexity Matrix as a tool for Strategy formulation & strategy Implementation will be of immense use to avoid businesses getting trapped in the web of Business complexity (Both Strategic& Operational Controls)

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Good Ethics is the Center Piece of Good Management

By Dandeson D. Panda, PhD
Magdi Elobeid, MS
University of Maryland Eastern Shore

Abstract

There has been a flood of unethical behavior by renowned executives of reputable companies. These executives engaged in falsifying financial records to mislead investors and the public about the excellent health of companies. Among some of the culprits of these misbehavior included Tyco, Worldcom, Lehman Brothers, Enron, American Insurance Group, Bears Stearns, Parmalant, Inclone, to name a few. Shame and disgrace tainted the reputations of these companies. The purpose of this paper is to add to the ethical debate on what is “the right thing” to do. “The purpose of ethics is not to make people ethical; it is to help people to make a better decision”⁶⁵.

Introduction

The global economy is becoming far more complex and highly competitive. The 21st. century has led to new technologies being developed. Based on the new and advanced technologies, products and processes are being developed and designed. New emerging markets are opening daily, new types of goods and devices are being sought after. In addition, new types of goods are being remanufactured to satisfy the needs of various consumers. As a result, workers in all levels within a firm are now been pressured to increase sales, reduce costs, and upgrade production. Top management and higher executives are under constant pressure to deliver an increasingly challenging productivity targets or sales quotas often creates an environment in which the organization proclaims the highest standard of business ethics. These pressures come in the form of performance rankings, monetary incentives and employment threats. Decisions and actions are taken in reaction to these pressures. Because of these pressures, executives and managers are driven into a conflict between the financial performance and the social performance of the business entity.

What is Ethics?

There are many approaches to the study of management ethics. Patrick and Quina (1997) and Bowie, N.E. and Werhane (2006)⁶⁶

“Ethics is the study of how people try to live their lives according to a standard of “right” or “wrong” behavior – in both how we think and behave toward others and how we would like them to think and behave toward us”⁶⁷.

People have a choice to follow a set of moral standards or some kind of ethical principles that provide direction on how people should conduct their daily lives in a respectable manner. There are people who can make choices that are not as transparent as they look to others for behavioral direction as to what constitute acceptable behavior as right or wrong, good or bad behavior. Deciding on the behavior one decides to follow might include many factors as to one’s up- bringing, culture, religion, beliefs and the prevailing environmental thinking of society.

Moral standards are cardinal principles based on one’s culture. Culture is a unique pattern of behavior by which one makes judgment on what is acceptable in society. These unique patterns of behavior might come from various sources such as friends, ethnicity, religion, school, Internet and last but not the least, one’s mentor.

“The purpose of ethics is not to make people ethical; it is to help people to make better decision”⁶⁸. The decision making process is essential in incorporating this perspectives in all functional business concentrations. It is the responsibility of teachers and practitioners to motivate and inspire people to apply knowledge of various business models and concepts to enhance creativity and growth in the field of ethics. The purpose of ethics is not to make people ethical; it is to help people to make better decision. Business people should be able to apply different

⁶⁵ Brown, Marvin T. (2000), Working Ethics: Strategies for Decision Making and Organizational Responsibility, Regent Press, p. vii.

⁶⁶ Patrick, J. A. and Quinn, J. E. (1997) Management Ethics, Integrity at work. (New Delhi: Sage Publication and Bowie, N.E. and Werhane, P.H. (2006) Management of Ethics (Oxford: Blackwell).

⁶⁷ Ghillyer, Andrew W. (2010), Business Ethics: A Real World Approach 2 ed. P. 6.

⁶⁸ Brown, Marvin T. (2000), Working Ethics: Strategies for Decision Making and Organizational Responsibility, Regent Press, p. vii.

frameworks, and models to develop and execute plans aimed at creating value for all stakeholders, not just shareholders.

Lack of sound decision making process at all levels of work and management can lead to mismanagement with a notorious lack of ethics. Ethical or unethical conduct is the province of everyone who works in an organizational environment. Failure to embrace ethical standards may lead to awful consequences such as the experience of Arthur Anderson, Enron, Lehman Brothers and Merrill Lynch.

The feeling that ethics contributes to long-term growth continues to have currency and many companies recognize the beneficial power of ethical management. Management is about people and good people working for a company require ethics. Decisions that are corporate, managers will serve or damage people, including the manager himself or herself. Good management need to be efficient and effective. Therefore, managers need good people to achieve goals and it is through people that management can obtain a level of efficiency. Should in case management fails to listen to people, disrespect their dignity and rights as workers, they are doomed for failure.

Ethics is the center piece of good management because of their influence on efficiency. When we have an efficient management that fosters growth of workers, workers in return will be dedicated and loyal in job performance. Added in this category is providing the necessary incentives, technology, structure and performance, communication, motivation and leadership. People involved in the organization are willing to work hand in hand in building trust and moral. The issue of trust, morality and willingness to cooperate can be killed when collaborators feel manipulated or treated in an unjustly manner. By increasing competitiveness, providing quality products, efficiency can contribute to mainstreaming jobs, thereby providing the livelihood of many people. Ethics is good management if applied appropriately. Ethics is the core of good management and can be demonstrated through excellent and sound managerial decision-making.

Ethics is a guideline for moral excellence as it focuses on choosing the best possible moral alternative in each situation. "Good ethics is good business"⁶⁹. Scholars have tried to convince managers and entrepreneurs that ethics are profitable in the long run. A book entitled "The power of Ethical Management" by Kenneth H. Blanchard and Norman V. Peale published in 1988⁷⁰ argued that it has been frequently demonstrated that the sacrifice of a short-term advantage will lead to a better long-term result in terms of both profitability and ethical aspiration.

Why Study Business Ethics?

According to Fernell, O.C. et al (2013)⁷¹ There are several reasons for studying business ethics.

Among these reasons are:

- Reports of unethical behavior are on the rise
- Society's evaluation of right or wrong affects its ability to achieve its business goals
- Studying business ethics is a response to Sarbanes – Oxley, FSGO, and stakeholder's demands for ethics initiatives.
- Studying business ethics will help you to identify ethical issues when they arise and recognize the approaches available for resolving them.
- You will learn more about the ethical decision-making process and about ways to promote ethical behavior within your organization.
- By studying business ethics, you may also begin to understand how to cope with conflicts between your own personal values and those of organization in which you work.

John Hooker (2011) argued that much of the business ethics literature centered our showing that ethical behavior is good for business⁷². It is extremely nice to be ethical but it's really law enforcement that makes the system work.

Hooker (2011) pointed out the following observations:

- It is ethics that make law enforcement work.
- Repeated waves of business scandals couple of years ago demonstrate how easy it is to get away with mischief.

⁶⁹ Blanchard, Kenneth H. and Pearl, N. V. (1988) *The Power of Ethical Management* (New York: William Morrow).

⁷⁰ Bowie, N.E. and Werbane, P.H. (2006) *Management of Ethics* (Oxford: Blackwell).

⁷¹ Farrell, O. C. et al (2013) *Business Ethics: Ethical Decision Making and Cases* 9th ed. South Western- Lougag Herring p. 216

⁷² Hooker, John (2011) *Business Ethics a Rational Choice*, Prentice Hall, 122.

- If ethics is to do its job, society must inculcate a disposition to be ethical.

Ethics was invented because ethical behavior is not identical with self-interested behavior. Ethical behavior is closely related to the workforce of society as a whole. Ethics make it possible for people to live together. It is good to be ethical in all we do but it is important to realize that its law enforcement that makes the system work. The current repeated wave of corporate scandals has shown how easy it is to commit a crime and get away with it. Getting away with corporate mischiefs has led to many corporations being destroyed. People will constantly violate the spirit of the law. People can easily find loop holes in financial, marketing, and advertising sectors to out-smart regulators.

To really be ethical, society must develop a position to be ethical. This being the case, society has to take the following steps: (a) agree on what is ethical, and (b) behave and act accordingly. This is a great challenge to deal with. However, each country has a cultural imperative to accomplish both the afore-mentioned criteria. Part of this could be accomplished by building a rational consensus. We talk the talk as well as walk the walk. It makes sense to obey traffic red light signals and highway speed limit.

There are many stakeholders with reasonable conflicting claims and society has to reach out with a convincing message about building rational consensus. We must strive to present a personal discussion that can arrive at an equitable solution.

5 ways of Developing an Effective Ethics Program

Companies have been ruined by unethical and illegal business conduct has continued to take place in organizations that have encouraged ethical programs. For instance, corporate scandals has rocked Enron, AIG, and Merrill Lynch who had in place codes of ethics designed to foster ethical decision-making in business. There is a failure in trying to implement organizational ethics in business. Many top executives and board members do not have the leadership skills and know-how on how to resolve these issues. Business ethics programs have the potential to help managers lay down an ethical culture and eliminate the opportunity for unethical conduct.

Some causes of unethical misconduct include the following but are not limited to the following: (a) people seeking to bend the rules or steal for their own personal gain, (b) believe policies and procedures are easy to bypass or override, (c) fear to losing their jobs if they do not meet targets (d) feel pressure to do whatever it takes to meet business targets, (e) believe that they will be rewarded for results, not the means used to achieve them, (f) lack familiarity with the standards that apply to the job⁷³.

Ethical decisions are made in a group environment composed of different value systems, competitive pressures, and political concerns that contribute to the opportunity for misconduct. The more misconduct occurs at a company, the less trust employees feel toward the organization.

An effective ethics program employs a variety of resources to monitor ethical conduct and measure the program's effectiveness. All employees are required to understand company's values and comply with the laid down policies and code of conduct that creates ethical culture. Should in case the company's culture encourages unethical conduct, then the misconduct is likely to occur even if the company has ethical guidelines in place.

It is a good policy for top business executives to open up a line of communication with managers at all levels and enforce overall ethical standards within the organization. An ethics program can help a business organization to avoid civil liability, reward for ethical behavior. Corporations stand to lose for failure to comply with the minimum requirements of the FSGO. The compliance with corporate ethical code and standards can be assessed by observing employees, performing internal audits and surveys, developing reporting systems, and conducting internal and external investigations.

Minimum Requirements for Ethics and Compliance Program

At the core of the FSGO is a "carrot-and-stick" philosophy. Corporations that act to prevent misconduct by establishing and enforcing ethical and legal compliance programs may receive "carrot" and avoid penalties should a violation occur. The "stick" whip used to punish corporations for unethical conduct. The FSGO encourages federal judges to impose fines for organizations that continually tolerate misconduct. Below are minimum requirements for ethics and compliance programs.

1. Standards and procedures, such as codes of ethics, that is reasonable of detecting and preventing misconduct.
2. High-level personnel who are responsible for an ethics and compliance program

⁷³ Farrell, O. C. et al (2013)

3. No substantial discretionary authority given to individuals with a propensity for misconduct.
4. Standards and procedures communicated effectively via ethics training programs
5. Systems to monitor, audit, and report misconduct
6. Consistent enforcement of standards, codes, and punishment
7. Continuous improvement of the ethics and compliance program

Contribution of Good Ethics to Good Management

According to Sheldon, Oliver (accessed 2013) Good arrangement should provide decent working conditions and should consult with employees and involve them in decision-making in the workplace⁷⁴.

Sheldon believed that industry existed for more than the profit of shareholders. Service to the community was the primary motive and fundamental basis of industry.

According to Drucker, Peter F. "management is the specific and distinguishing organ of any and all organizations. It must be realized that management is a human, not mechanical activity. It is carried out both by people and for people – conscious and free beings – and this involves ethics. Ethics is generally considered as personal moral qualities. These qualities include integrity, trust worthiness, courage and a sense of service.

Ethics can be discussed in a negative or positive sense, in a manner intrusive to management. It is essential to recognize that management ethics are embedded in management in those ways: 1. through managerial decisions, 2. through the ideas and value which drove the practice of management and 3. through the manager's moral character.

Eventually, a manager's decision and subsequent action bring about three different types of external effect. These are material business results, people impact, and environmental impact.

Material or business results – measured in economic terms, production and selling capacity, profitability and market share.

People impact – customer's satisfaction in terms of needs and wants. Satisfaction or dissatisfaction levels of consumers in its distribution network, reliability of sales reps, accuracy of information provided and prices.

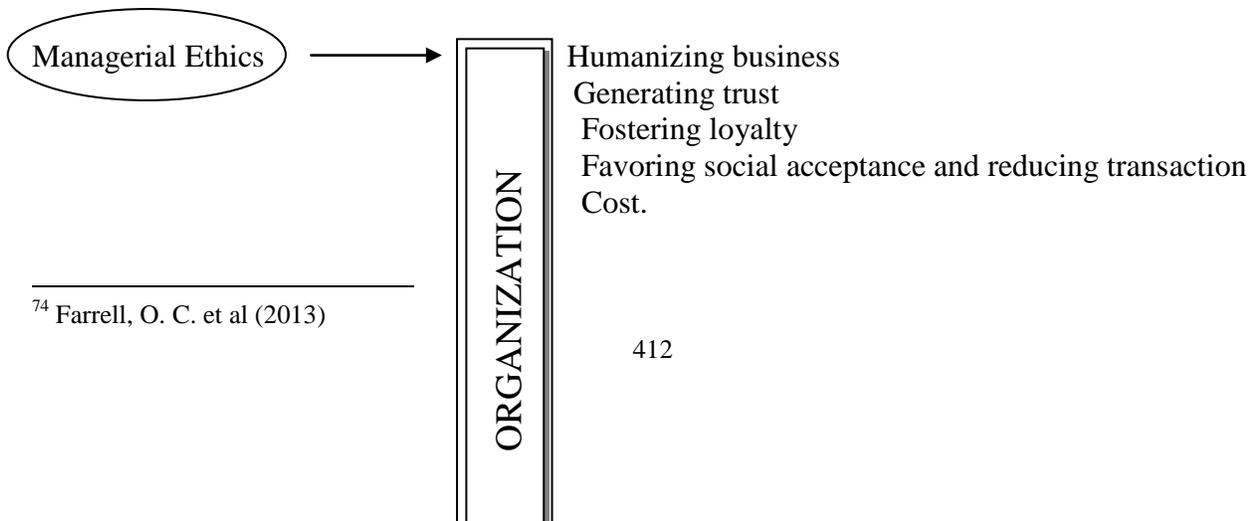
Environmental impact – production facility can contribute to pollution and waste. The disposal of waste may have certain impacts on the natural environment.

The internal effects of a manager's performance can generate learning that tends to influence future actions. Three internal effects can be distinguished: Psychological and physical effects. – Whatever action a manager takes will breed emotional feelings of satisfaction or dissatisfaction. Managers have to be sensitive to avoid taking any action that might be taken negatively.

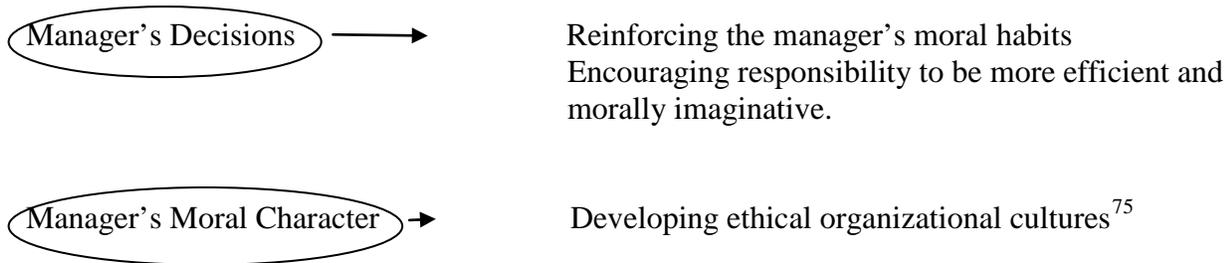
Operational learning – managers learn by experience overtime. The manager can learn how to improve his/her interaction with customers, listen to their concerns and take corrective actions to solve the problem. Moral learning – It is assumed that managers learn from mistakes. This learning process helps to solve the damage of bad publicity, avoid fraud, deception and make a positive contribution to educating consumers.

Ethics is part of a manager's moral character. The manager's actions can show honesty, diligence, concern for people, a great sense of service. The actions of former executives of Enron, World Com, Parmalat and Adelphia communications demonstrated greed as a leading motivator for committing fraud. The importance of moral character in management is good when a person with decent moral character displays good behavior with naturalness, ease and enjoyment.

Ethics is embedded in management through managerial decisions. Domenee Mele 2013 pointed to seven consequences of ethics management.



⁷⁴ Farrell, O. C. et al (2013)



Causes and Consequences of Ethics in Management⁷⁶

The causes and consequences of ethics in management include the following:

1. Humanizing business --- promotes the idea of doing things effectively and efficiently through people. Treating people fairly will make them to work harder, increase efficiency and increase productivity result.
2. Generating trust --- Trust promotes interpersonal collaboration among workers, high performance rating, boast individual credibility and the development of effective safety cultures.
3. Promoting loyalty --- loyal employees are willing to work hard and contribute to the success of the business. Loyal employees become a driving force behind the growth, profits, and lasting values within the organization⁷⁷.
4. Favoring social acceptance and reducing transaction costs --- In the absence of fraud, deception, and hostile attitude that can lead to rejection and hostile reactions, workers, and the environment might look favorable to accepting the company in good spirit. With the acceptance of the company, people will want to deal with the company in a level playing field in terms of trust and honesty. By working with people who have demonstrated a sound knowledge of moral integrity and good reputation may help to improve the company's image and reputation.
5. Reinforcing the manager's moral habit --- A manager who is willing to accept responsibility for his/her actions and make amends for his/her actions will be looked upon favorable. An acceptable behavior against wrong doing is very necessary to receive good disposition.
6. Encouraging responsibility to be more efficient and morally imaginative --- Efficiency should not be obtained at the expense of violating human dignity or through inhuman means. Efficiency depends on innovations and technical competencies to enhance the wellbeing for people and a better living and livelihood of people. Managers should strive for excellence and make decisions that are not narrowly embedded in a restricted context. Hence a utilitarian approach is appropriate to deal with this issue.
7. Developing ethical organizational culture --- There are many factors that influence organizational culture: the corporate mission, and values, the control system employed, organizational and power structure, and some practices as corporate symbols, rituals and routines, stories and myths. For these to occur, there is a need for leadership⁷⁸. Leadership is the key to organizational development. Leadership gives form and

⁷⁵ Sheldon, Oliver (1923) *The Philosophy of Management* (London: Pitman & Soars).

⁷⁶ Drucker, Peter (1999) *Management Challenges of the 21st century* (New York: Harper Collins) p.9.

⁷⁷ Male, Domenee, (2013) *Management Ethics: Placing Ethics at the Core of Good Management* p.12.

⁷⁸ Reichhold, F. (1996) *The Loyalty Effect: The Hidden Force Behind Growth, Profit and Lasting Values* (Boston Harvard Business School Press).

function to human association. Leaders help to set the tune, develop the vision, and shape the behavior of those involved in the organization's life. Without the continued commitment, enforcement, and modeling of leadership, standards of business cannot and will not be achieved in an organization.

Ethics are not only desirable for contribution to management, but necessary for good management. I believe that ethical failures are management problems. Ethical management can be difficult in some situation but it requires courage⁷⁹.

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Application of Analytic Hierarchy Process Technique: A Literature Review

Rakesh Gupta, Walden University, email: rakesh.gupta@waldenu.edu

Hari Sharma, Virginia State University, email: hsharma@vsu.edu

Cheryl Mitchem, Virginia State University, email: cmitchem@vsu.edu

ABSTRACT

The purpose of this research paper is to review published literature related to the application of analytic hierarchy process (AHP) in various disciplines including business. We intend to study this multi-criteria decision-making (MCDM) technique from various perspectives including the disciplines, industries, and countries of applications. Additionally, we intend to illustrate the technique through an example. The findings reveal that the AHP technique is used globally. The technique is integrated with many decision-making techniques, to design and develop better decision support systems. We expect the study will generate constructive ideas on exploring new dimensions, such as, investment decision-making, capital budgeting, and cost allocation techniques. Additionally, students, researchers, and professionals, will benefit from the study by considering the AHP technique for enhancing their qualitative and quantitative decision-making capabilities.

Introduction

An efficient decision-making process is dynamic and evolving. It requires the integration of new tools and techniques in designing sophisticated application systems. The latest applications are focusing on combining the disciplines including mathematics, statistics, operations research, accounting, and finance. The commonly used financial decision analysis tools apply Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period, Return on Investment (ROI), Cost-Benefit Analysis (CBA) or Benefit-Cost Analysis (BCA), Total Cost of Ownership (TCO), and Economic Value Added (EVA) of a portfolio. However, these quantitative tools lack qualitative aspects of decision-making based on their strengths and weaknesses. Strategic decision making with stochastic future implications involves multiple criteria including opinions of stakeholders, ranking of factors, and evaluation of alternatives. Therefore, a decision-making process also requires a quantitative method for analyzing qualitative and quantitative criteria simultaneously (Bhushan & Rai, 2004). Researchers have suggested numerous applications of AHP for transportation planning, presidential election, product portfolio selection, resource allocation, stock market analysis, and mergers and acquisitions. T. L. Saaty, while working on research projects for the U.S. Army, invented the analytic hierarchy process (AHP) technique to provide optimal solutions for a given problem of complex variables (Saaty, 2008).

AHP is a quantitative decision-making approach, for unstructured problems, which uses pairwise comparisons to determine the relative importance of various criteria and the relative strengths of the decision alternatives. In addition, AHP is an operations research method, which involves quantitative evaluations of qualitative criteria. The descriptive research design using AHP has its bias, such as, quantifying the choices, rank reversals, and splitting bias, yet the process has been useful in homogenous unstructured environments (Bhushan & Rai, 2004). The AHP technique allows the handling of tangible and intangible criteria simultaneously by applying subjective decisions. A survey approach seems to be most suitable for data collection of quantitative data using descriptive information and pairwise comparison questions.

We intend to share the application of AHP integrated systems in various areas to draw the attention of students, researchers, and professionals for its extensive use. The remainder of the research paper encompasses the following sections: Literature Review, Research Methodology, Discussion, AHP Model, and Summary and Recommendations.

Literature Review

We reviewed more than 100 research papers where we found compelling applications of AHP integrated systems. Based on our review, we found that AHP has limited applications in isolation. However, it has been found

immensely useful to support other methodologies. The technique is considered more a synthesizing tool than an analyzing tool. In this technique, a complex problem is decomposed into a hierarchy of structures, measured, and then synthesized for meaningful decision-making. Thus, the technique has three primary functions: (a) structuring complexity, (b) measurement on a ratio scale, and (c) synthesis.

Since the introduction of the AHP technique in the 1970s, the technique has been used globally in selecting products, suppliers, and consultants. In addition, the technique has been used for research and development (R&D) decisions on portfolio management, technology implementation, and engineering designing decisions. Additionally, the technique is used for organizational structure, investment, and political decisions. Capital budgeting, cost allocation, and cost-benefit analysis are also in the purview of AHP.

Recently, the AHP technique has been applied in several business areas. Min (2010) applied AHP technique in evaluating the comparative service quality of supermarkets to monitor their service delivery process, identify relative weaknesses, and take corrective actions for continuous service improvements. Lee and Yu (2013) designed a portfolio model for component purchasing strategy for elevator manufactures to achieve competitive priorities and identifying a need of aligning with strategic goals. Jyoti, Banwet, and Deshmukh (2008) evaluated the performance of national research and development organizations in India based on their relative efficiencies using several output measurement criteria. In addition, they integrated data envelopment analysis (DEA) method with the AHP technique to perform the analysis. Amarina and Yusof (2010) developed a manufacturing performance evaluation model for Malaysian small and medium size automotive enterprises. The AHP model could be used to identify the strengths and weaknesses where and how the improvements are to be made. Wang, Wang, and Wang (2012) focused on the risk evaluation of SME financing based on Grey theory with the integration of AHP technique. Daim et al. (2011) applied the AHP model in refresh planning for information technology enterprises using several criteria including supportability, cost, and scalability.

Research Methodology

We adopted a structured methodology to search the published literature pertaining to applications of the AHP technique. The relevant peer-reviewed publications from online databases such as EBSCO Host, ProQuest Central, and ScienceDirect, for the past three years, were analyzed. The analysis process involved categorizing the selected publications from various perspectives into global, industrial, and research disciplines. The steps in the AHP analysis procedure are as follows (Murata & Katayama, 2010; Saaty, 2008):

1. Formulate an objective
2. Define criteria and subcriteria
3. Assign a rating scale
4. Identify alternatives
5. Construct an AHP hierarchy
6. Perform criteria and subcriteria ratings
7. Evaluate ratings of the alternatives
8. Select the best alternative

The pairwise comparisons of factors in the AHP technique use a fundamental scale, defined by Saaty and Vargas (1994) as shown in Table 1.

Table 1: Fundamental Scale		
Intensity	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the objective
3	Moderate Importance	Experience and judgment slightly favor one activity over another
5	Strong Importance	Experience and judgment strongly favor one activity over another
7	Very Strong Importance	Experience and judgment very strongly favor one activity over another
9	Extremely Important	Experience and judgment favor at highest possible

		order, one activity over another
2,4,6,8	Intermediate Values	Can be used if needed
Source: Saaty and Vargas (1994)		

In pairwise comparison, all n factors from a set w are compared with each other. The results $a_{ij} = w_i/w_j$ of the pairwise evaluations can be written into an n -by- n matrix $A = (a_{ij})$ with $i, j = 1, 2, \dots, n$. The prescribed rules are (a) $a_{ij} = 1/a_{ji}$ and (b) $a_{ij} = 1$ for all $i = j$. The matrix A can be written as follows:

$$A = \begin{matrix} & A_1 & \dots & A_n \\ \begin{matrix} A_1 \\ \vdots \\ A_n \end{matrix} & \begin{bmatrix} w_1/w_1 & \dots & w_1/w_n \\ \vdots & \dots & \vdots \\ w_n/w_1 & \dots & w_n/w_n \end{bmatrix} \end{matrix}$$

or with $a_{ij} = w_i/w_j$ and $i, j = (1, \dots, n)$

$$A = \begin{bmatrix} 1 & a_{12} & \dots & a_{1n} \\ 1/a_{12} & 1 & \dots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ 1/a_{1n} & 1/a_{2n} & \dots & 1 \end{bmatrix}$$

Each factor in the matrix, a_{ij} describes the relative importance assigned to comparison of factor w_i with w_j . Matrix A is positively reciprocal because of the transitivity rules. Once the priorities are determined, a test of consistency is required to examine the extent of consistency of each judgment. The comparison matrix is validated using a consistency index (CI) and a consistency ratio (CR) to check for the consistency (Saaty & Vargas, 1994). The consistency ratio CR is calculated as (CI/RI) , where CI is the consistency index. CI is calculated with λ_{max} , where λ_{max} is the principal Eigenvector of the decision matrix, $CI = (\lambda_{max} - n) / (n - 1)$. The Relative Index (RI) is the average consistency index as shown in Table 2.

n	2	3	4	5	6	7	8	9	10
RI	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49
Source: Saaty and Vargas (1994)									

The judgments are considered consistent when the value of CR is less than 10%. However, in AHP, consistency is not to be forced because inconsistencies are the natural outcome of human opinions or perception. Therefore, Inconsistencies are acceptable within a critical threshold.

Discussion

The key areas of AHP applications are described as follows based on our literature review:

a) Resource Allocation:

Woods Whole Fisheries used the AHP technique in budget allocation, Savannah River Site Remediation for simplifying and optimizing multi-site remediation portfolio, and Air Force Medical Services for reallocating resources. Scarborough Public Utilities used the technique for understanding customer and company values. Additionally, the Air Products and Chemicals Company used the AHP technique for tactical R&D project evaluation and management (Forman & Gass, 2001).

b) Prioritization and Evaluation:

Korea Telecommunication Authority (KTA) used the AHP technique to prioritize, forecast, and allocate resources. The University of Santiago, Chile, applied the technique to develop proposals for research funding based on the criteria important to the government and achieved a 100% level of success. Royal Institute of Technology, Stockholm, applied the technique to screen working fluids for engineering applications. Rockwell International used the AHP technique for criteria weighting, utility functions, and sensitivity analysis for NASA projects (Forman & Gass, 2001).

c) Selection of Alternatives:

The Xerox Corporation used AHP technique for achieving the highest level of success in technology implementation, engineering design selection, and R&D decisions on portfolio management. NASA used the AHP technique to select power source to beam power to the moon's surface. British Columbia Ferry Corporation, Canada, used the technique in the selection of suppliers, consultants, and products (Forman & Gass, 2001).

d) Health care management:

The University of Rochester's School of Medicine used the AHP technique to minimize cost, length of patient stay, and test complications. The University of Pittsburgh used the technique for merit compensation decisions involving department goals and objectives, such as, leadership in clinical service, strong, and competitive residency programs, and financial stability (Forman & Gass, 2001).

AHP Model

We next discuss a hypothetical example for structuring and prioritizing the factors for constructing an investment portfolio. We used the factors as beta, P/E ratio, PEG ratio, long-term return, standard deviation, and analyst opinion. The beta measures the riskiness of a security in comparison to the stock market. Price to Earning (P/E) ratio measures the relationship of the price of a share in comparison to the earnings per share of a company. Price/Earning to Growth (PEG) ratio is a valuation measure for determining the relative tradeoff between the price of a share, earnings generated per share, and the expected growth of a company. The long-term return refers to the returns received by an investor over a long period, such as, 3, 5, or 10 years. Standard deviation measures the volatility of a stock return for a given period. Analyst opinion implies the opinions of financial experts/analysts about on the performance of the stock price in terms of buy and sell recommendations.

In the model as shown in Figure 1, we conducted a pairwise analysis of six factors to prioritize their importance based on hypothetical data. Based on the priorities, the objectives will be set for stock selection decision making. Figure 1 shows that the priorities of factors can be used to select stocks for portfolio construction from the alternatives (Stock A, Stock B, Stock C, and Stock D).

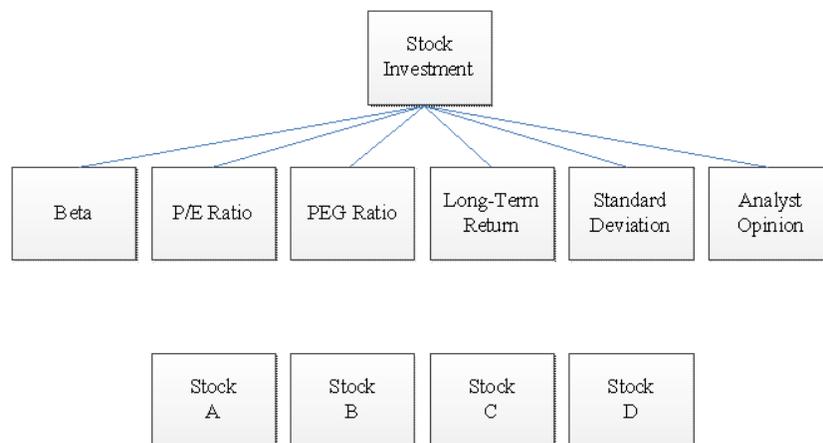


Figure 1. An AHP Model for Stock Investment

Summary and Recommendations

In this research paper, we have attempted to discuss the applications of the AHP technique through a review of the literature appearing in peer-reviewed publications. Our findings revealed that AHP technique was used globally to solve complex problems in various disciplines. The AHP has been instrumental in structuring complexity, measurement, and synthesis. A successful decision-making, based on AHP technique is dependent on measurement of ratios for factors of the objective. The application of AHP was demonstrated by a case example of stock selection process for constructing a desired investment portfolio. The global acceptance of AHP reveals its contribution as one of the best decision making technique implemented by several organizations. Based on our findings, we plan to design AHP integrated systems in the area of accounting and finance, specifically, capital budgeting and portfolio management. We suggest that the applications of AHP should be integrated with other techniques such as Goal programming, artificial neural network, and Delphi techniques for improving decision-making capabilities.

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Data Envelopment Analysis (DEA): An Approach to Setting Institutional Performance Benchmarks

Nuria Cuevas, SACSCOC, ncuevas@sacscoc.org;

Demetria Gibbs, SACSCOC, dgibbs@sacscoc.org;

Alexis Matveev, SACSCOC, amatveev@sacscoc.org;

Enrique G. Zapatero, School of Business, Norfolk State University, (757) 823-2505, egzapatero@nsu.edu

Abstract

The primary intent of this article is to provide an introductory overview of Data Envelopment Analysis (DEA) in terms of its potential use as one of the quantitative approaches for setting benchmarks of performance in higher education institutions. The concept of DEA is not a new phenomenon in organizational efficiency and benchmarking studies. However, traditionally, the application of DEA was most prevalent in government and corporate sectors (Phillips, 2005). Although DEA is a relatively new concept in higher education, colleges and universities across the globe are increasingly utilizing this methodology to determine appropriate or efficient benchmarks for various input and output measures. Traditional theories of non-profit behavior suggest that higher education institutions have little economic incentive to engage in efficient performance practices. For example, Bowen (1980) asserted that universities spend all funds they receive in the quest for arbitrary excellence. Similarly, Robst (2001) argued that operations of higher education institutions are often driven by the “pursuit of excellence” and “prestige maximization” in contrast to economic efficiency conventionally assumed for profit maximizing businesses. Thus, a common modus operandi for colleges and universities could be arguably characterized as “doing more with more.”

Indeed, in recent years, DEA has become a popular analytical tool to evaluate performance of and to rank colleges and universities as well as academic departments and programs (e.g., Agasisti & Dal Bianco, 2009; Bougnol & Dula, 2006; Eff, Klein, & Kyle, in press; Johnes, 2006; Koksal & Nalcaci, 2006; Leitner et al., 2007; Taylor & Harris, 2004). In terms of applying DEA in the context of graduation rate studies, Archibald and Feldman (2008), Breu and Raab (1994), Cherikh, Eyob, and Ikem (2004), Eckles (2010), and Zheng and Stewart (2002) applied DEA techniques to study efficiency of the U.S. higher education institutions with graduation rates as one of the outputs. Abroad, Avkiran (2001), Afonso and Santos (2008), Bradley, Johnes and Little (2010), and Kantabutra and Tang (2010) included retention and graduation rates or number of graduates in the studies of efficiency of Australian, Portuguese, and Thai universities respectively. The remaining discussion is structured as follows. The next section offers an overview of benchmarking in the context of institutional effectiveness and continuous enhancement via the use of DEA. The following section describes the conceptual characteristics of DEA. The third section provides a non-technical overview of DEA. The fourth section outlines key reasons for application of DEA in institutional effectiveness and assessment studies. Some limitations of DEA are identified in the fifth section. The last section provides a summary and conclusion.

I. Benchmarking

Given the great diversity of the American higher education system, a puzzling question often faced by the institutional effectiveness and assessment professionals is how to set aspirational yet attainable and realistic benchmarks for student achievement measures such as graduation and retention rates. This question becomes even more urgent in the context of the current “Completion Agenda” (e.g., Walters, 2012; <http://completionagenda.collegeboard.org>) that calls for institutional leaders to set ambitious degree completion goals and for government agencies and foundations to align institutional funding with institutional graduation rates.

Furthermore, the federal government has recently introduced an expectation for regional accreditation agencies to evaluate the appropriateness of institutional student achievement output measures such as course completion rates, graduation rates, licensure exams pass rates, and job placement rates. For example, in the Southern region, the reaffirmation of accreditation review committees are now required to examine and analyze not only evidence provided to document student achievement but also “the appropriateness of criteria and threshold of acceptability used to determine student achievement” (SACSCOC, 2012, p. 94). However, it largely remains unclear for institutional effectiveness and assessment professionals how to determine, justify and evaluate appropriateness of benchmarks for student achievement output measures. A conventional practice for developing benchmarks for

graduation and retention rates is essentially based on regression analysis (Astin, 1997). Variations of this approach are employed by various organizations such as the Higher Education Research Institute (www.heri.ucla.edu/GradRateCalculator) and the US News & World Report. Recently, Powell, Gilleland, and Pearson (2012) extended the use of regression analysis in benchmarking by developing a structural equation model relating institutional characteristics and expenditures with output measures such retention and graduation rates. However, Archibald and Feldman (2008) convincingly argued that non-parametric production frontier methods, such as Data Envelopment Analysis (DEA) provides institutional effectiveness professionals with a complementary method to establish graduation rate benchmarks in addition to traditional approaches based on regression analysis, "...graduation rates should be compared to best practices measured by a production frontier, not average practices measured by a regression equation" (p. 81). DEA refers to an estimation approach utilized to study and evaluate efficiency of a group of similar complex institutions with multiple inputs and outputs. Essentially, it is based on an optimization algorithm solved through a mathematical linear programming method. In contrast to regression analysis, DEA is not based on a priori assumptions or hypotheses about the parameters or the functional form of the relationship between inputs and outputs. Further, DEA focuses on the empirical best practice, not average behavior of institutions in the sample. Identification of a best practice in a given peer group is a key component in benchmarking studies. In the institutional effectiveness context, benchmarking refers to "identifying an issue on campus that needs improvement, identifying another institution that has developed one of the best approaches to dealing with this particular issue, studying what that institution has done, and adopting that institution's practice" (Dew & Nearing, 2004, p. 22). Dunn, McCarthy, Baker, and Halonen (2010) define benchmarks as "reasonable, reason-based, and peer-sanctioned criteria" (p. 3) that "provide a set of standard reference points for internal self-studies and external reviews" (p. 4). We suggest DEA is an appropriate and useful methodology for benchmarking studies in higher education as it identifies inefficient areas at a target institution as well as determines best performing school(s) in the given institutional peer group in regard to the identified areas for improvement. Thus, this technique helps institutional researchers address the first two components in Dew and Nearing's definition of benchmarking and lay a groundwork for further analysis of best practices.

II. Data Envelopment Analysis (DEA): Conceptual Characteristics

Essentially, DEA is based on a fundamental assumption that if a given college or university is capable of producing outputs at a certain level with a certain level of inputs, then other *similar* institutions should also be able to produce the same level of outputs if they were to operate efficiently. Furthermore, DEA is defined by the following four key characteristics. First, DEA reflects *systems thinking*. Higher education institutions produce certain output and outcomes from certain inputs by utilizing certain production processes. Thus, from the efficiency perspective, performance of colleges and universities should be essentially evaluated in terms of the ratio of outputs to inputs (Sullivan et al., 2012). This characteristic of complex higher education organizations requires institutional researchers to consider simultaneous effects of several input variables (including the input variables' interactions among themselves) on the multiple output variables. One of defining features of DEA is that, essentially, it treats the production process that converts inputs into outputs or generates multiple outputs from the main effects (and also the interaction effects) of the multiple input variables as a "black box." This means that DEA does not require the researcher to define the extremely complex and poorly understood educational process that transforms input variables such as SATs of incoming students and institutional expenditures in various categories into output variables such as retention and graduation rates. In other words, in the DEA approach, nothing is assumed about the production processes of institutions, other than that they exist. Consequently, DEA technique is well suited to the environments characterized by *joint production*, such as higher education (Sullivan et al., 2012). Universities and colleges have multiple inputs and outputs. Furthermore, in higher education settings, it is difficult to specify direct relationships (functional forms or parameters) between these multiple inputs and outputs and to assign specific weights to specific inputs and outputs. DEA "can be used to measure efficiency when there are multiple inputs and outputs, but there are no generally acceptable weights for aggregating inputs and outputs" (McMillan & Chan, 2006, p. 3). The clear advantage of DEA as a preferred methodology is that it sidesteps the often involved subjectivity of other techniques that require estimating weights of variables as well as setting functional forms to describe relationships between multiple input and output variables. Third, DEA is based on analysis of *observed best* (not average) *practices*. Efficiency is measured relative to the actual performance of the 'best practice' institutions. Performance evaluations based on regression analysis are grounded in the "central tendency" concept and efficiency or inefficiency is determined by the magnitude of deviation from the average

performance. In contrast, DEA uses deviations from the performance of the most efficient institutions in the given group to evaluate performance of other institutions. Avkiran (2001) pointed out,

DEA estimates the production function of efficient [institution] using piecewise linear programming on the sample data instead of making restrictive assumptions about the underlying production technology. The importance of this feature is that a university's efficiency can be assessed based on other observed performance (p. 60).

In the pursuit of excellence and prestige maximization, policy-makers at institutions do not seek to achieve average performances; rather they often aspire for 'best practices' since institutional changes always carry associated accounting, economic, and human factor costs. The expected benefits of institutional changes must outweigh the considerable costs associated with those changes. If institutions are aiming for "average" improvements instead of the "most efficient" (within its peer group) ones, their net benefits will be smaller relative to the benefits associated with the "most efficient" since it is assumed that the associated costs of the institutional changes are comparable whether aiming for best performances or simply average ones. Finally, DEA is an *action-oriented* research approach as it helps planners identify appropriate (i.e., best practice-based and attainable) performance targets or benchmarks for inefficient institutions. Thanassoulis, Kortelainen, Johnes, & Johnes (2004) noted that "the strength of DEA is that when we do identify a unit as inefficient, the benchmarks will clearly indicate why that unit is deemed inefficient" (p. 3). Vercellis (2009) elaborated,

In real-world applications it is often desirable to set improvement objectives for inefficient units, in terms of both outputs produced and inputs utilized. Data envelopment analysis provides important recommendations in this respect, since it identifies the output and input levels at which a given inefficient unit may become efficient (p. 392).

DEA results establish a clear pathway for improvement relative to the best performer in the peer group studied by providing specific performance targets that are grounded in the observed efficiency ratios and, thus, devoid of campus political issues that often frame planning and decision-making on college campuses.

III. Data Envelopment Analysis (DEA): A Brief, Non-Technical Overview

Data envelopment analysis (DEA) refers to a methodology utilized to compare peer or functionally similar complex organizations based on an efficiency measure. Grounded in Farrell's (1957) research on linear programming techniques, DEA was developed and popularized by Charnes, Cooper, and Rhodes (1978). Detailed technical treatment of the DEA's mathematical foundation and methodology is beyond the scope of this paper. Coelli et al. (2005), Cooper et al. (2007), and Zhu (2008) provide a comprehensive discussion of DEA. Johnes (2004, 2006) presents a focused overview of DEA methodology for efficiency measurement in educational settings. Dyson et al. (2001) highlight common pitfalls in DEA application and suggest practical protocols to address the pitfalls.

There are two basic DEA approaches – output-orientation and input-orientation. In output-oriented DEA models, inputs are kept constant "while the possibility of proportional expansion of outputs is explored" (Johnes, 2006, p. 275). For example, the output-oriented or output maximization DEA procedure helps the researcher determine the extent to which each inefficient institution can increase its graduation and/or retention rates in order to become efficient without increasing the current level of financial inputs. In other words, output-oriented DEA procedure informs development of specific targets or benchmarks for institutional outputs such as graduation and retention rates. In contrast, in input-oriented DEA models, "outputs are assumed to be fixed and the possibility of proportional reduction in inputs is explored" (Johnes, 2006, p. 275). The input-oriented or input minimization DEA procedure determines the amounts that each institution can reduce in at least one of the input categories such as financial resources without reducing current levels of outputs such as retention and graduation rates. DEA is a non-parametric technique that optimizes weighted ratios of outputs to inputs for each institution, which is reported as either a number between 0-1 or 0-100 percent. These scores are referred to as efficiency ratio scores and are calculated by using linear programming methods to estimate piecewise linear production function in the context of observed peer group performance. Essentially, the efficiency score represents the difference between observed performance of the focus institution and the best practice performance in the peer group. Score of 1 or 100 percent indicates that the focus institution produces higher levels of aggregated outputs with a set amount of inputs (or utilizes lower amounts of aggregated inputs while producing a given level of outputs) compared to other institutions in the sample. Institutions with scores below 1 or 100 percent are considered inefficient relative to the best practice institutions in the peer group. It is important to reiterate that the efficiency scores are relative – institutions are considered to be efficient or inefficient only in the specific context of the given institutional peer

group. So when we refer to efficiency we refer to relative efficiency based only on the performance of the institutions included in the sample. Based on the efficiency ratio scores, DEA plots institutions in a multi-dimensional space. A defining feature of DEA multidimensional space is the efficiency frontier (or data envelope). Institutions with scores of 1 (100 percent) determine the efficiency frontier that envelops performance of other, inefficient institutions comprising the peer group. The efficiency frontier represents the maximum output that can be produced given available inputs, or, alternatively, minimum inputs required to produce given output levels. In other words, institutions located on the frontier presents the best practice performance in the peer group. A graphic in Figure 1 helps to illustrate the concept of envelopment.

Supposedly, we have a simple model with just two inputs (instruction expenses per FTE and student services expenses per FTE) and only one output (retention rate) for a peer group of 37 institutions. X and Y axes represent ratios. The two inputs serve as numerators in the ratio and one output serves as the denominator in both ratios. The X-axis represents the ratio of “instruction expenses per student FTE” (input 1, numerator) to “retention rate” (output, denominator). The Y-axis represents the ratio of “student services expenses per FTE” (input 2, numerator) to “retention rate” (output, denominator). Based on efficiency scores produced by these ratios, an institution can be plotted on the graph (see Figure 1 below).

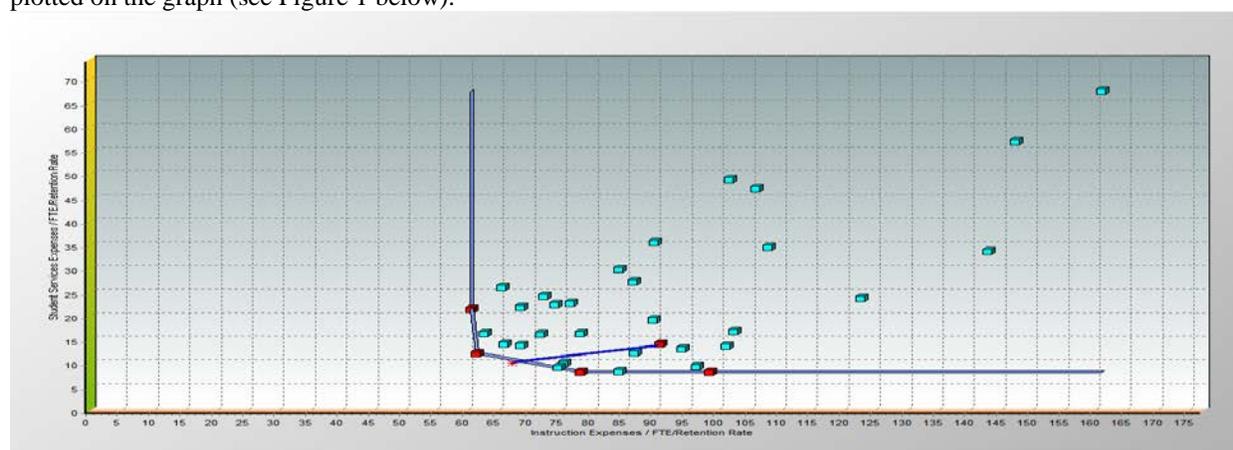


Figure 1. Output-Oriented Model for One Output (Retention Rate) and Two Inputs (Instruction Expenses per FTE and Student Services Expenses per FTE)

In this example, four institutions (red dots) form a concave efficiency frontier (blue line) that envelops other data points or inefficient institutions (light blue dots) in the sample. Institutions represented by red dots are considered to be best practice or efficient institutions in the given peer group. Institutions represented by light blue dots are considered to be inefficient because their outputs per unit of inputs are below the observed benchmarks (i.e., institutions represented by red dots). Inefficient institutions can become efficient by a proportional increase of the output (retention rate, i.e., denominator in the ratios) while keeping the two inputs (instruction expenses per FTE and student services expenses per FTE) fixed. By increasing “retention rate” or the denominator in the X and Y ratios, both ratios are decreasing thus moving the target institution to the left on the graph – closer to the blue line or efficiency frontier. DEA analysis provides information that shows the location of the given institution (“focus institution”) relative to the efficiency frontier or to the best practice institutions. The red dot inside the envelope represents the focus institution, which is classified as inefficient in this example. The point of intersection between the line from the focus institution and the frontier represents the *performance target* for the focus institution or maximization of the output (increase in the retention rate) needed to move the focus institution onto the efficiency frontier. Again, it is important to note that regression analysis, a most common inferential statistics approach, is characterized as a central tendency approach that evaluates institutions relative to the performance of an average institution. In contrast, DEA is an extreme point method; it compares each institution with only the “best” institutions. The DEA uses the most efficient outliers (red dots) to set the efficiency frontier (blue line). The efficiency or best practice frontier indicates the maximum quantity of outputs that can be obtained from a given combination of inputs and expresses the minimum quantity of inputs that must be used to achieve a given output level (Vercellis, 2009, pp. 386-387). So, efficiency frontier can be described as a virtual line that connects or fits

through the most efficient outliers and envelopes all other, inefficient institutions or grey circles in the sample. Therefore, the name of this technique is Data *Envelopment* Analysis (DEA).

IV. Benefits of DEA in Institutional Effectiveness and Assessment Studies

There are several important benefits of DEA application for planners and decision-makers in educational institutions (Johnes, 2004). First, DEA approach takes into consideration the complex nature of higher education institutions and accommodates multiple inputs and multiple outputs measured in different units within a single analysis. As Cooper, Seifert, and Tone (2007) pointed out, DEA is especially beneficial in studying organizational contexts characterized by “the complex (often unknown) nature of the relations between the multiple inputs and multiple outputs” (p. xxix).

Second, DEA does not assume nor require a judgment on the relative importance or weights of inputs and outputs. As it was noted earlier, in contrast to regression-based approaches, DEA, as a non-parametric approach, does not require an a priori equation relating outputs and inputs. DEA estimates the production function of efficient institutions using piecewise linear programming on the observed data instead of making restrictive subjective assumptions about the underlying production technology in terms of relationships between inputs and outputs and their weights. Thus, one of DEA’s important strengths is its objectivity –DEA models “do not require the specification of a priori weights for the variables” and, consequently, “efficiency scores are not based on the subjective opinion of people” (Ozbek et al., 2009, p. 829). Third, DEA application can be used to set specific input and output targets for inefficient institutions based on the observed performance of best practice institutions in the peer group. The strength of DEA is that when we do identify an institution as inefficient, the analysis will clearly indicate why that unit is deemed inefficient. In real-world, policy makers, administrators, and researcher need to set performance targets for inefficient institutions, in terms of both outputs produced and inputs utilized. DEA identifies the output and input levels at which a given inefficient institution may become efficient. Furthermore, in the spirit of continuous quality enhancement philosophy advanced by many accreditation agencies, input and output performance targets should be based on the best observed practice measured by a production frontier, not on the average practice measured by a regression equation. Fourth, DEA helps identify the “efficient reference group” or specific best practice institutions for the target institution. When we apply DEA to a group of peer institutions, we identify benchmark colleges and universities in that peer group “that offer the lowest total operating cost for their mix and absolute levels of output” (Thanassoulis, et al., 2011, p. 3). Such institutions provide rich case studies for follow-up qualitative research projects set to explore best practices in college management. Fifth, identified efficiency scores and targets are based on the current best practices; thus, it is known that both scores and targets are practically attainable. Finally, DEA is characterized by the “units’ invariance” property (Cooper et al., 2007). DEA allows the researcher to include variables of different types of units of measure.

V. Limitations of DEA

DEA focuses on “relative,” not “absolute” efficiency. Institutions labeled as efficient are only efficient in relation to other colleges and university in the given sample and for given variables in the analysis. It may be possible for an institution outside the sample to achieve a higher level of efficiency than the best practice institution in the sample (Avkiran, 2001, p. 60). In other words, since DEA focuses on relative efficiency, institutions found to be efficient in one peer group may in fact be inefficient when compared to a different set of peers. Thus, it is important to conduct multiple DEA analyses with various peer groups for the target institution and to carefully review and compare improvement benchmarks. DEA assumes that the institutions in the sample are homogenous in their production function or technologies of transforming inputs into outputs. In practice, identification of a relatively homogeneous group of higher education institutions might be problematic even when using national data sets, especially if financial indicators are used as variables. For example, although data sets typically have defined categories for the categories of expenditures, “accounting practices vary across institutions” and what may be regarded as ‘academic expenditures’ by one institution may not be for another” (Salerno, 2003). Researchers should utilize rigorous approaches to forming institutional peer groups and take extra care in selecting variables for the analysis. Another limitation of DEA is its assumption that the data used in the analysis is free of measurement error. As DEA is a deterministic approach to assessing efficiency, it makes no allowance for the possibility of random errors in the data. Further, because DEA is an extreme point technique and because it estimates efficiency relative to other institutions in the sample, true outliers and/or data entry errors can significantly distort efficiency scores (Salerno, 2003). Thus, DEA is particularly sensitive to unreliable data (Avkiran, 2001). Special care should

be taken in identifying inputs and outputs for the model as the inclusion of numerous interrelated outputs and inputs in DEA analysis might result in multicollinearity. Finally, as a relatively new approach DEA might be somewhat difficult to explain. As efficiency scores in DEA are obtained by running a series of linear program formulations, it becomes intuitively difficult to explain the process of DEA to the nontechnical audience and/or decision makers for the cases in which there are more than two inputs and outputs. An audience that does not have background in linear programming or have quantitative research training exclusively in inferential statistics methods may not easily grasp the DEA logic and may find it difficult to comprehend its results.

Conclusion

DEA provides benchmarks to stimulate campus-wide analysis, reflection, and improvement As Dunn et al. (2010) argued, “[b]enchmarks provide a guiding standard for comparing what *is* with what *could be* achieved with redirected effort, energy, attention, or resources” (p. 3). However, it should be emphasized that results of DEA analysis are not “information for action.” They are “food for thought and discussion” as the colleges and universities are streamlining, aligning, and improving institutional operations to maximize student achievement and success. DEA results should be analyzed with substantial caution and must be used only after a thorough, meaningful, and participatory interpretation. After careful examination

[T]he results of DEA can be used to direct decision makers’ attention to developing a better understanding of the reasons why some [institutions] are located on the efficient frontier and are thus efficient and why others are inefficient. DEA may trigger decision-makers to try to identify the differences in formal structures, operational practices (managerial practices, field practices, etc.), or other organizational factors of the [institutions] that may account for the observed efficiency differences in the [institutions] (Ozbek et al., 2009, p. 829)

Dew and Nearing (2004) pointed out that “...the benchmarking organization observes best practices from the perspective of looking for new ideas that will fit within its organizational context” (p. 100). DEA provides objective, observed practice-based data not only to stimulate thinking; it also helps college administrators and institutional researchers focus and structure thinking about campus operations. As the current constantly changing higher education environment encourages institutions to engage in ongoing organizational learning, Sutherland and Katz (2005) remind us, “it is the interpretations of events (or constructs) within a structured ‘meaning making’ environment whereby learning can occur” (p. 257). DEA is emerging as a new instrument in the college administrators’ toolbox that allows institutional planners and administrators “to assign *organizational meaning* to the observed efficiency differences and to determine the organizational changes that the inefficient [institutions] will need to undertake and how to implement such changes” (Ozbek et al., 2009, p. 829, emphasis added).

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A Study of Impact of Green Marketing on Sales

P K Gupta, Institute of Management Studies, Devi Ahilya University, India, pkgupta_in@yahoo.com.

Ashish Gadekar, RTMNU Nagpur, avgadekar@gmail.com.

Rimalini Gadekar, Department of Mechanical Engineering, Government Polytechnic Nagpur, India.
rimalini@yahoo.com

Abstract

Economics of marketing is one of the important aspects of Green Marketing. Marketers need to understand the implications of Green Marketing in terms of business as well as environmental protection. The present study has been aimed at studying the impact of companies green marketing awareness on sales. The study was conducted using primary data collected from 79 organizations of Agra and Nagpur using e-mail or postal questionnaire method. Only the organizations who have implemented the green marketing program were selected for the study. Results indicate that the in the initial stages of the implementation of green marketing program sales goes down but gradually it starts surpassing the sales of those who do not implement it.

Introduction

Green Marketing incorporates a wide range of activities, encompassing product modification, production process changes, packaging changes, as well as modifying advertising and other activities intended to satisfy human needs or wants. American Marketing Association has expressed that "Green or Environmental Marketing consists of all activities designed to generate and facilitate any exchanges intended to satisfy human needs or wants, such that the satisfaction of these needs and wants occurs with minimal detrimental impact on the natural environment." (Baker, 2002)

Green marketing has also been termed as Environmental Marketing and Ecological Marketing. Recently, World over Governments have now recognized the importance of Green marketing and began to implement environment-friendly policies. Since resources are limited and human needs and wants are unlimited, resources have to be utilized economically and in an environment friendly manner. The marketers should realize this and move on towards Green Marketing. (Chaudhary, 2006)

Indian Government has already introduced Environment Protection Act in 1986 and Environment Audit in 1992. Green marketing can operate from three perspectives:

The Personal - through products and individual benefits,

The Social - through communities and associations,

The Public - doing business and cultural leaders, credible resources (Armstrong, 1994).

Firms while adopting Green Marketing strategy have faced number of challenges which are:

1. **Cost:** Green Marketing implementation for green products/services, green technology, green power/energy requires the large amount of finances making the strategy a costly proposition. (Brahma, 2008)
2. **Trust:** The basic characteristic of resistance to change customers have shown a little trust towards Green marketing. Firms inspite of their best efforts specially in the green, products have not been able to gain much attention of customers towards green marketing. A concept of Eco-labeling was initiated and offered since 1978 in Germany still customers have shown a Luke-warm response. (Grant, 2007)
3. **Only Long Term Gains:** Initially the profits are likely to be low due to expensive but initially low level operations. Green marketing will be successful only in long run.

4. **Unwillingness to pay more:** Customers have failed to show willingness to pay a higher price for Green Products in comparison to conventional products, which affect the sales.
5. **Price War:** Firms in order to win the price war against both traditional products as well as from the competitors might lead to making Green Marketing revolution a failure.
6. **Confidence:** The firms practicing Green marketing have to strive hard to convince stakeholders for Green Marketing products acceptance. (Bansal,2005)

4 Research Methodology

Researcher has been observing the situation for an year before taking the subject for research. Through continues reading and listening to various talks by the experts following objectives were formulated to study the concept. The study is based on three basic pillars of Green Marketing. Namely Awareness, Myths and Implementation. The objectives were further refined after interaction with real time Green Marketing Practitioners.

4.1 Research Objectives

1. Green Marketing Awareness Identification
2. Problems encountered in the Green marketing practices implementation
3. Impact of Green Marketing Implementation on sales.

4.2 Hypotheses

Since the study was aimed at exploring the impact of Green Marketing on Sales and not the significance testing of the impact ,the hypotheses developed as a guideline to study have been formed in the positive manner, stating the positive relationship and not negative. Based on the previously cited theoretical and empirical literatures, the following hypotheses referring to the sales were proposed.

Hypothesis 1: There is no significant difference in the awareness levels of the companies in the various sectors regarding the eco-friendly Business.

Hypothesis 2: Green Marketing Practices have no significant impact on sales.

4.3 Data Collection:

The tool for research chosen was a structured questionnaire developed by the researcher for the present study. In order to obtain the basic concepts of Green Marketing like reusability, responsibility, transparency, reengineering and eco friendly approaches were included in the questionnaire. The question-naire was developed into two parts. First part consisted of information of generic nature while the sec-ond part dealt with the questions relating to the knowledge, skills, Green Education, Green Awareness etc. All questions in the second part were with close ended response categories. This was purposefully adopted to ease the respondent to answer.

Sample size: Two cities Agra and Nagpur were selected for the study. These cities were selected due to ease of data collection and both cities belong to two different states, where there are different cultures. This was done to see indirectly if there is any impact of culture on the results. Finally 79 organizations were identified from AGRA and NAGPUR into different area of Business.

Twenty Five companies of Agra and Nagpur were administered the initial questionnaire as a part of the Pilot study to remove the discrepancies of the questions designing and necessary corrections were made in the questions while including in the final questionnaire..

Respondents in the following category formed the spectrum of the sample for research. Majority of them were from core business segment.

TABLE 1
SHOWING SAMPLED COMPANIES PROFILE

RESPONDENT ORGANIZATION TYPE	NUMBER	PERCENT
MANUFACTURING	8	10
ASSEMBLING	3	4
PRODUCTION	13	16
MARKETING	53	67
PACKAGING	2	3

Data obtained was analyzed. Since the study was exploratory in nature and aimed to see the impact of Green Marketing on sale no specific statistical analysis technique was used. Data was subjected to t-test analysis and the results have been shown and discussed through tables and graphs.

5 Results and Discussion

5.1 Study of Degree of Green Aspects, Awareness and Implementation by Companies Nagpur-Agra Companies

For the needs of the present research, companies from Nagpur (Maharashtra India and Agra (UP India) were surveyed using a questionnaire by email, by fax, and by regular mail. The survey was launched on April 2010, and the procedure of gathering responses ended on Aug March 2010. We have sent a total of 500 questionnaires to addresses of companies, in equal proportions in both the regions. Unfortunately, at the end of the entire procedure of collecting responses and after numerous repeated calls, we have managed to collect only 79 properly completed questionnaire. Based on their business activity, 54 percent of production companies participated in the survey together with 46 percent of service sector companies. Of all companies participating as the respondent for the study, 62 percent employed up to 50 persons, 26 percent from 50 to 250 persons, while in the remaining 12 percent companies the employees strength was more than 250.

The data collected was analyzed using t-test. After applying the appropriate hypothesis testing procedures the following analyses was made:

H01: There is no significant difference in the awareness levels of the companies in the various sectors regarding the eco-friendly Business. Awareness with reference to Greenness Score of the respondents.

TABLE 2
SHOWING SIGNIFICANCE OF AWARENESS TOWARDS GREENNESS

Awareness	Greenness	N	Mean	S.D.	Levines Test Equality of Variance F - value	Significancan ce of Equality of Means	t-test	Significanc e 2-tailed
Equal variance assumed	<35	320	3.5	.43	.394	.531	1.49	0.137
Equal Variance not assumed	>35	175	3.44	.39			1.53	0.127

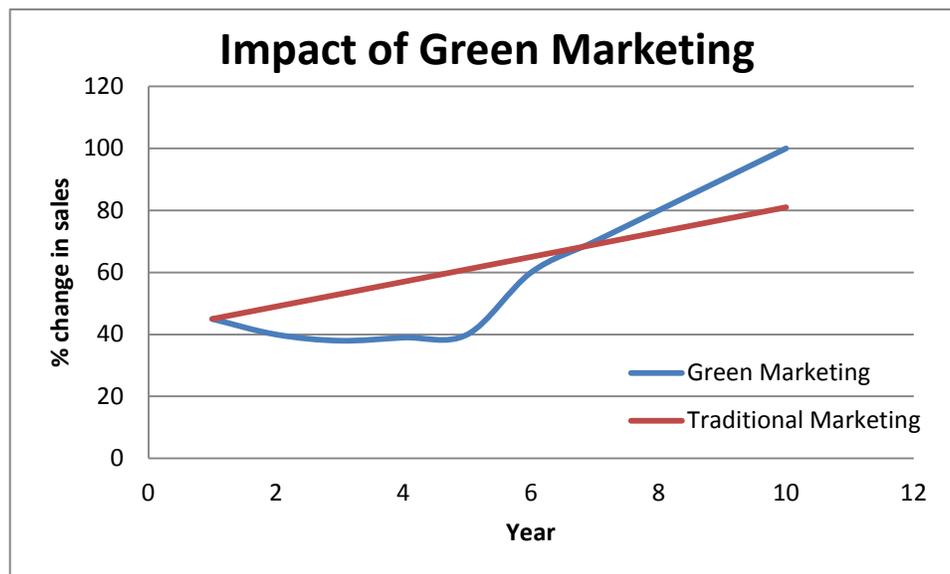
The insignificant t-values for the awareness of greenness when then the equal variance was assumed and equal variance was not assumed indicates that the awareness of greenness has no impact on the companies eco-friendly aspect of the business.

H02: Green Marketing Practices have no significant impact on sales.

TABLE 3
SHOWING THE SIGNIFICANCE OF GREEN MARKETING PRACTICES IMPACT ON SALES

Year	Average % change in Sales after GM	Traditional Approach
1	45	45
2	40	49
3	38	53
4	39	57
5	40	61
6	60	65
7	70	69
8	80	73
9	90	77
10	100	81

FIGURE 1
SHOWING THE IMPACT OF GREEN MARKETING PRACTICES ON SALES



The Table 2 and the figure 1 indicates the significant relationship between the Green marketing practices and the sales. The graph in the figure 1 shows that in the initial stages of the green marketing practices the sales volume declines but as the companies intensify their green marketing practices the sales volume start rising. Taking an Hockey shape curve.

6.1 Conclusion

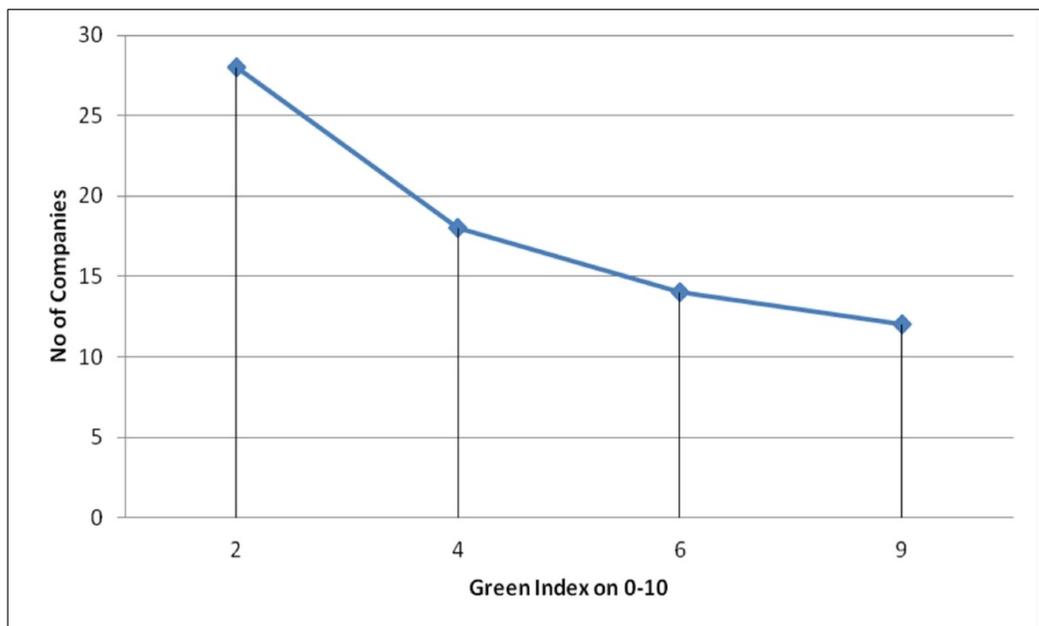
Economics of marketing is one of the important aspect of Green Marketing. Marketers need to understand the implications of Green Marketing. If you think customers are not concerned about environmental issues. And they are not ready to pay a premium for products that are more Eco-responsible, think again. Product innovation and Product change should enhance your product's performance and strengthen your customer's loyalty and command a higher price. Green Marketing is still in its infancy. Lot of research is underway on Green Marketing to fully explore its potential.

In this dynamic-changing and hyper competitive commerce era, enterprises have to successfully manipulate their entire resources not only to cut down cost in manufacturing but to also create the most effective and beneficial marketing strategy in order to strengthen their competitive advantages to satisfy the customers' demands. Green Marketing is not going to be an easy concept. The firm has to plan. And then carry out research to check feasibility in going Green. Adoption of Green Marketing may not be easy in the short run, but in the long run we may not have left with any choice. It is definitely going to have a positive impact on the firm in long run.

Green Marketing should not be considered as just one more approach to marketing. It has to be pursued with much greater vigour as it has societal and environmental dimensions attached to it. Government and Social organizations may compel all the organization to practice Green Marketing. But should we wait for the day to come for sustainable development. A smart marketer is one who not only convinces the consumer, but also to make aware about the need and the advantages of green products. The green marketers will have full support of the Government, and the consumers also will not mind paying more for a cleaner and greener environment.

Many of the organizations, in spite of the Governments' best efforts and incentives to promote Green Marketing, have failed to promote Green Marketing as still they are apprehensive about the use of the data.

FIGURE 2
SHOWING THE ACCEPTANCE OF GREEN MARKETING BY COMPANIES.



A company while considering the implementation of Green Marketing strategy should consider the following:

- Green strategy needs to be advocated as the colour of social-responsibility.
- Energy savings, resource conservation, and reduced emissions should be considered as bench-marks of green B2B products.
- Biodegradable and/or easily recycled, reduced toxins, and engineering are required to be implemented for increased efficiency and reduced maintenance.

- Price will always be a factor considered in purchasing decisions. Selling green products at price points higher than competitors can dampen sales, unless the cost of consumables, such as energy, is predicted to dramatically increase in the near-term. If you plan to sell an energy-consuming green product at a higher price than less-efficient competitors, you may want to provide customers with information about applicable utility rebate programs, and government incentives.

- Green message needs to be presented emphatically.

- Green message should be focused and should answer the question: "Why would someone buy your product?"
- Green washing and Green Myopia are the reasons for low trust of customers in Green Products resulting in low sale.

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STUDENT LEARNING AND ENGAGEMENT: INTRUSIVE PEER TUTORING APPROACH

*Daniel Okunbor, Fayetteville State University, Fayetteville, North Carolina, USA
Richard Bazzelle, Fayetteville State University, Fayetteville, North Carolina, USA
Michael Eni, Fayetteville State University, Fayetteville, North Carolina, USA

*Corresponding Author; research is supported in part by National Science Foundation DUE Grant Award #1036257.

Abstract

Peer Tutoring or Peer-Assisted Learning paradigms have been known to impact a variety of academic success variables for both the tutors and the tutees. These academic success variables include but not limited to persistence, retention, social wellbeing, academic performance and timely graduation from college. In this research, we analyze the impact of intrusive peer tutoring approach. In this model, tutors are hired at the beginning of the semester. Students who have need for assistance in their courses are required to sign in for tutoring and must provide detailed information of their availability. The tutoring takes place in a monitored environment, i.e., a designated tutoring center. In this paper, we examine the academic performance of all tutees for two consecutive semesters. One of our preliminary findings was that students who participated in at least five (5) of the tutoring sessions, with all things being equal, successfully completed courses in which they were tutored.

Background Information

Peer Tutoring and Peer-Assisted Learning paradigms have been known to impact a variety of academic success variables for both the tutors and the tutees. These academic success variables include but not limited to persistence, retention, social wellbeing, academic performance and timely graduation from college. As an institutional student support infrastructure, peer tutoring and peer-assisted learning, have different implementation approaches at institutions of higher learning. While some are drop-ins and unmonitored, others are monitored. In some, tutors are peers who have successfully completed courses that they tutor, and in others, tutors may be graduate students. Other models that have been utilized consisted of trained certified peer tutors, peers tutors who assisted or serve in the role of the instructor (supplementary instruction – peer tutors participate in the class and provide supplementary instruction to a group of students at predetermined times outside of class).

The practice of peer tutoring is very old and has a rich history, which is traceable back to the ancient Greeks (Topping, 1996; Wagner, 1990). A linear definition of peer tutoring can be to perceive the peer tutor as a surrogate of the teacher, in that transmission of knowledge flows downward, from teacher to tutor to tutee (Topping, 1996). A more pedagogy definition of peer tutoring states that, peer tutoring is an approach in which one peer instructs another peer in material in which the first peer has a firm understanding of the course material and the second is a novice in the material (Damon & Phelps, 1989).

Peer-assisted learning has garnered much attention in scientific literature. However the increased attention did not occur until the last several decades. Peer tutoring has been found to be an effective technique for increasing academic achievement amongst students (Topping, 1996; Topping et al., 1997). Furthermore, peer tutoring has displayed highly effective result in enhancing both tutor and tutee academic achievement and skill development (Falchikov, 2001; Greenwood, Delquardi & Hall, 1989). Peer tutoring in higher education is being used with increasing regularity to aid in motivation, student learning, and empowerment. Peer tutoring has been successfully implemented in many universities worldwide to promote student learning (Colvin, 2007).

The authors understand the relevance of peer tutoring in promoting students' academic and social integration within the institution; which are ingredients for Tinto's model for student retention. In 2010, the first author and

several faculty members at Fayetteville State University in North Carolina received the Historically Black Colleges and Universities Undergraduate Programs (HBCU-UP) Implementation Grant from the National Science Foundation to support a plethora of retention and graduation efforts for the Science, Technology, Engineering and Mathematics (STEM) students. The funded program was named Integrated STEM Academic Success (ISAS) because of its highly integrated approach to improving retention and graduation in STEM. Prior to ISAS, the institution’s approach emphasized the Supplementary Instruction model with little lab based tutoring that was entirely drops-in. While one would like to call these approaches “coarse” grain, the tutoring approach utilized by the ISAS is more of “fine” grain. This “fine” grain peer tutoring model is also called intrusive peer tutoring approach. In this model, tutors are hired at the beginning of the semester. Students who have need for assistance in their courses are required to sign for tutoring and must provide detailed information of their availability. Tutees are assigned to tutors based on course compatibility and common time availability and are required to remain with the same tutors for the remainder of the semester. The tutoring takes place in a monitored environment, i.e., a designated tutoring center. The tutors undergo rigorous screening during application processing and interview stages. They are also expected to participate in the national training program designed for tutor certification. After several semester implementations of this novel approach, it was deemed necessary to examine its impact of the both tutees and the tutors. In the next section, we would describe implementation details and their impacts and effectiveness. We would present our findings and recommendations for future improvements.

Two Semester Implementations of Intrusive Peer Tutoring

The intrusive peer tutoring was implemented in three (3) consecutive semesters and one (1) summer session at Fayetteville State University, a historically black college and university in the southeastern region of North Carolina. The university enrolls approximately 6000 students, of which, about 80% are from under-represented minority backgrounds. Roughly, 10% of the students are majoring in STEM disciplines. The lower level math and science courses are believed to be “bottlenecks” for the inability of many students to declare major and be retained in STEM fields. The intrusive peer tutoring approach was designed to mitigate retention challenges in the lower level, so called STEM “gateway” courses, which include college algebra, pre-calculus I and II, general chemistry I and II, principles of biology, general zoology, general physics I and II and cellular biology.

The tutoring centers are in two (2) locations on campus and are monitored by the two (2) full-time professional tutors, who have undergraduate degrees in math or science. The professional tutors are responsible for the coordination all tutoring activities, including hiring and training peer tutors, recruiting tutees, assigning tutees to tutors, maintaining time schedules for all tutoring sessions, end of semester assessment of the peer tutoring program.

The number of tutees increased significantly from 92 in fall 2011 to 234 in fall 2012. The first full implementation of the intrusive tutoring occurred in fall 2011 with much few number of peer tutors. In fall 2012, there were 19 peer tutors as opposed to 10 peer tutors in fall 2011 and spring 2012, to maintain an average of 10 tutees by peer tutor. This way, peer tutors are not overloaded with tutoring responsibilities that would hinder their academic performance. Peer tutors meet with tutees at least once a week and the frequency of the meetings may be modified according to the need of the tutee. However, as per University’s policies, the maximum allowable number of work hours for students is 20.

	FALL 2011	SPRING 2012	SUMMER 2012	FALL 2012
Total Number of Requests	92	110	59	234
Total Number of Tutees Served	88	97	57	215
Total Number of Tutees that Passed	69	75	47	182
Total Number of Tutees that Failed	19	22	10	33

Table 1: Summary Data of Tutees for all Terms

Table 1 and Figures 1 & 2 depict the number of tutees served for all three semesters and the summer and the percentage of tutees that successfully completed courses in which they were tutored. By successful completion, we

mean that the student received a grade of at least a “C” and above. Included in Figure 1 is the total number of students who requested for tutoring. Clearly, not all the tutoring requests were met, either due to the unavailability of tutors for courses for which tutoring requests were made or that the students did not report for tutoring after the requests have been initiated. The percentages of successful completion are based on students who attended at least one tutoring session. Students who commenced tutoring and later withdrew from their tutored courses before the end of semester, who received “incomplete” grades or extended grades as defined in the University’s catalog, were not included in the total number of students served. Although, we stressed students’ retention in their tutored courses, students withdraw for several other reasons other than their suspicion of obtaining a failing grade in their tutored courses.

From Figure 2, the percentages of tutees that successfully completed their tutored courses are 78%, 77%, 82% and 85% in fall 2011, spring 2012, summer 2012 and fall 2012 semesters, respectively. The tutoring program met its target of 75% for all semesters and summer session. The increases reported for summer session and fall 2012 are indication of successful implementation of intrusive peer tutoring.

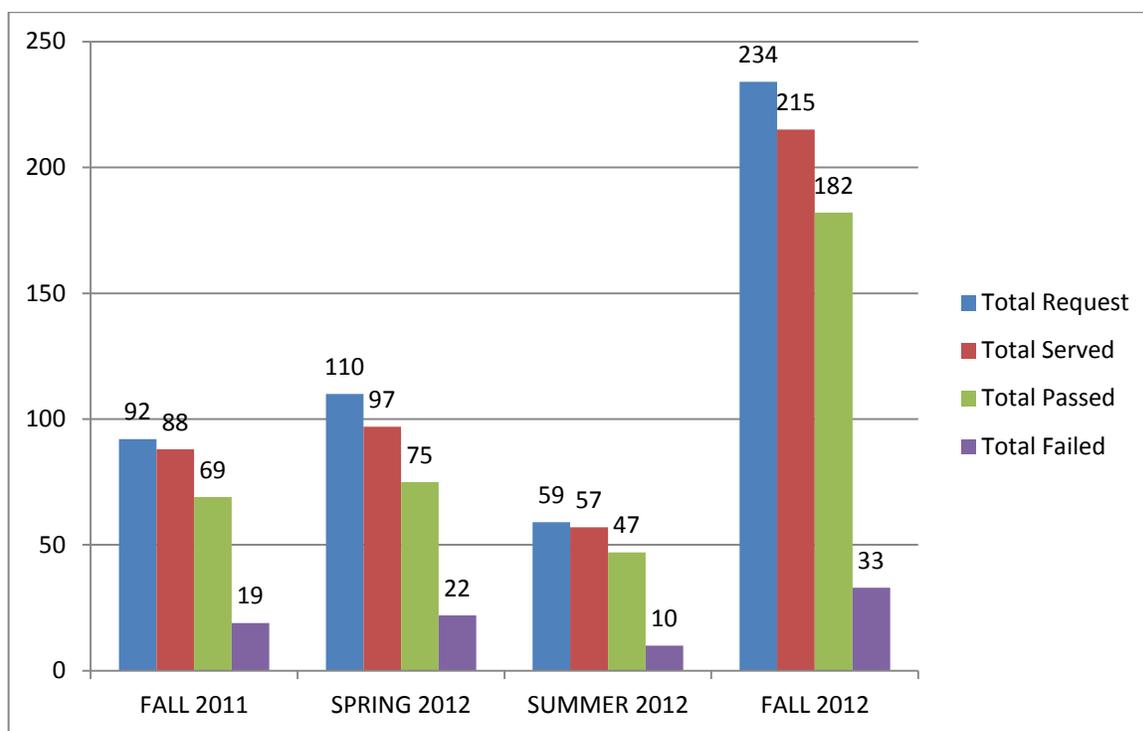


Figure 1: Tutees’ Success Data for Intrusive Peer Tutoring

In order to further understand the impact of the intrusive peer tutoring, we tallied the midterm grades of tutees and compared them with their final grades. For fall 2011, only 50 tutees have their midterm grades reported. Of this number, 38 improved in their final grades by at least one point increment. In fall 2012, midterm grades were reported for 123 of the tutees, 43 (this is equivalent to 35%) of them improved in their final grades by at least one point increment. Although midterm grades are used as a measure of student’s progress in the course half way into the semester, however, a significant number of tutees did not have their midterm grades reported. It must be noted that, out of these 123 tutees whose midterm grades were reported, 78 (or 63%) of them obtained a grade of “B” and above. The fall 2012 final grade distribution of tutees is shown in the pie chart below (Figure 3). Clearly, 64% of the tutees obtained grades of “B” and above in tutored courses. This is over and above the average percentage (which is currently about 41%) of students completing typical STEM “gateway” courses with grades of “B” and above.

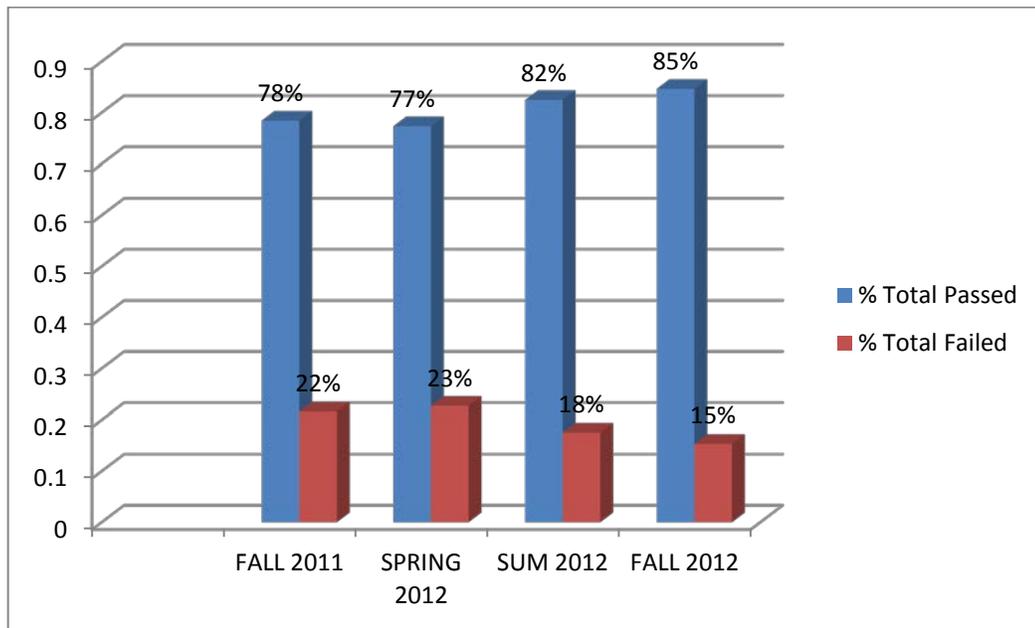


Figure 2: Percentages of Successful Completion

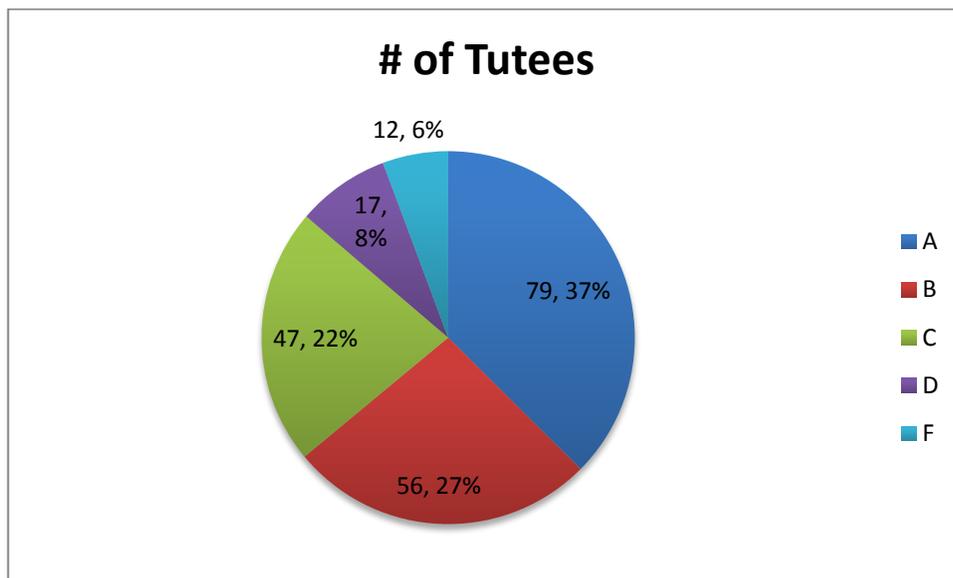


Figure 3: Grade Distribution for Fall 2012

From Table 2, we report on the number of tutoring sessions tutees attended for fall 2011. This was made possible by the attendance software installed on a sign in computer placed in the tutoring center. The reporting data for spring 2012 and fall 2012 are being compiled will be analyzed in subsequent articles. Our preliminary analysis revealed that the more tutoring sessions a tutee attended, the higher the probability of successfully completing his or her tutored course. This is certainly expected, however, for 95.8% of tutees that participated in 10 tutoring sessions or more to successfully complete their tutored courses is remarkable. Further analysis revealed that 90% of tutees that attended at least 5 sessions successfully completed their tutored courses. Although, not thoroughly scientifically proven, it is believed that students who are able to attend 5 or more tutoring session are able to complete the course successfully.

Total Number of students who attended 10 or more tutoring sessions	72
Total Number of students who attended 10 or more tutoring sessions and scores C & above	69 (or 95.8%)
Total Number of students who attended 10 or more tutoring sessions and scores below C	2
Total Number of students who attended 10 or more tutoring sessions and receive EX-F	1
Total Number of students who attended 10 or more tutoring sessions and receive (I grade)	0

Table 2: Fall 2011 Tutee Data on Tutoring Sessions Attended

Concluding Remarks

As indicated earlier, peer tutoring, is not only beneficial to the tutees but also to the tutors. Tutors gain enormous experiences in communication, in-depth content knowledge, interpersonal relationship skills and pedagogies. These are invaluable “soft” skills for successful career in any disciplines. More importantly, involving students in peer tutoring where they are reasonably compensated demonstrates in them, scholarship and builds self-confidence and sense of belongings that are necessary for increasing students’ retention as described in Tinto’s model for retention. Tutor and tutee are able to share academic and campus life experiences to the extent that they draw knowledge from each other. This is clearly the essence of peer mentoring. Ultimately, the intrusive peer tutoring combines the benefits of both peer mentoring and the conventional “drops-in” tutoring approaches.

The ISAS peer tutoring may have comparable successes similar to those reported for Supplementary Instruction (SI), but this is yet to be investigated. The ISAS intrusive peer tutoring sprung out of the Center for Promoting STEM Education and Research (CPSER), which the university has been supporting through Title III since 2008. Although, the CPSER program is open to all students enrolled in lower level STEM courses, the ISAS program is open only to STEM majors. This is because the ISAS program is designed to increase student enrollment, persistence, retention and graduation in the STEM disciplines.

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