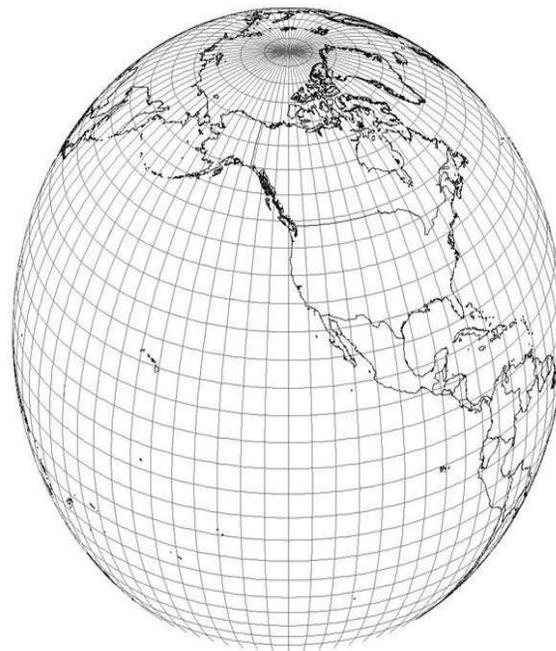


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Global Digital Business Review

Editorial Notes

We are pleased to present this issue of the Global Digital Business Review (GDBR), Volume 4, No. 1, October 2010. The editorial mission of GDBR is to publish original contributions over a wide range of topics relevant digital business, Cyber infrastructure and global collaboration and competitive policies/strategies. GDBR is an interdisciplinary publication directed towards academicians, policy makers, government, non-government organizations, and global business practitioners. Conceptual and empirical studies that are timely and relevant are considered for publication. The publications in GDBR are subject to editorial review.

We would like to acknowledge reviewers who have helped to review the manuscripts submitted to this volume. We also thank the editorial board of GDBR, the Department of Business, Management and Accounting and the Department of Mathematics and Computer Science at the University of Maryland Eastern Shore, as well as, the Global Digital Business Association for their support. Without their meaningful contributions and volunteerism, this issue of GDBR would not be possible.

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SELECTION, IMPLEMENTATION & SUPPORT OF SAP ERP SYSTEM APPROACH IN MANUFACTURING INDUSTRY

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ABSTRACT

Companies worldwide have made substantial investments in installing & implementing SAP ERP systems. Some of the unique challenges in managing enterprise-wide projects which were highlighted through the findings included the challenge of re-engineering business processes to 'fit' the process which the SAP ERP software supports, investment in recruiting and reskilling technology professionals, the challenge of using external consultants and integrating their application-specific knowledge and technical expertise with existing teams. Many researchers have concluded that the failures are usually the result of business problems instead of technical difficulties. Using the case study method that involves direct observation and systematic interviews at UK based Chemical MNC, Cement, Steels manufacturing firms; this study investigates the relationship between SAP ERP implementation practices and a manufacturing firm's competitive strategy. The results confirm our research proposition, that SAP ERP implementation should be aligned with competitive strategy. Specific guidelines are suggested for making the alignment. The findings from the qualitative study and the results from the quantitative study were found to be equivalent, thus, ensuring a fair assessment of the validity and reliability of the instrument developed to test the causal model. The quantitative measures done only at four firms are not statistically significant but the samples were used as a part of the triangulation method to collect data from multiple sources.

Keywords: Systems Applications and Products in Data Processing (SAP), Enterprise Resource Planning (ERP), Project Management, Enterprise Central Component (ECC), Manufacturing, and Implementation

INTRODUCTION

Definition of ERP (Enterprise Resource Planning) is a set of integrated business applications used to carry out the most common business functions. ERP systems have evolved over the past 40 years. The study of SAP ERP Implementation focus to address in view of the Increasing Business Volume, need to Adopt Modern Technology any fast growing Organization plan to implement SAP ECC 6.0 ERP in across the Group location companies, starting with Core Business Area. Study includes Surveyed companies cited executive commitment, a clearly defined business case, strong project management and people with the abilities and skills needed to carry a project to completion as the most important factors to successful SAP implementation. SAP Implementation strategies describes whether a company chooses a “Big Bang” or a step-by-step approach, the strategy must reflect business-specific constraints and objectives. The emergence of SAP ECC 6.0 technology has created an opportunity to ensure information and business process equality both at organizational and global levels. SAP ECC 6.0 serves as a catalyst for information integration within and beyond the organizational scope through its standardized software modules., while at the same time working as a vehicle for transferring best practice business processes. The SAP reference models are among the most comprehensive reference models, including over 4000 entity types and covering over 1000 business processes and inter-organizational scenarios.

In this excerpt, find an introduction to SAP ERP ECC 6.0 and learn what questions you should ask before deciding on implementation. Discover how to build a business case for SAP ERP ECC 6.0 and who should be educated before implementation begins. Key people need to learn about SAP ERP before they can do a proper job of creating the vision statement and estimating costs and benefits. Implementing SAP ERP means changing the way the business is run. Consequently, top management and operating management must be committed to making it happen. Without a solid projection of costs and benefits, the necessary degree of dedication may not be attained and the chances for success will decrease sharply. Study reviews an existing ERP literature and provides the inter-organizational best practice of SAP ERP system implementation. The study examined the different SAP ERP lifecycle phases and provided the insight factors that were crucial to overall success in implementing SAP ERP. The study suggests researchers re-examine the following SAP ERP issues at the inter-organizational level, selection of

SAP ERP packages, integration of business processes, knowledge and applications, implementation approaches, training as well as organizational transformation and software migration.

1. COMPETITIVE EDGE

What is SAP ERP (Systems, Application & Products in Data Processing)?

- SAP is the leading Enterprise Information and Management Package worldwide. Use of this package makes it possible to track and manage, in real-time, sales, production, finance accounting and human resources in an enterprise.
- SAP is integrated ERP software manufactured by SAP AG that targets business software requirements of midsize and large organizations in all industries and sectors.
- SAP AG Company founded in Walldorf, Germany in 1972 by 4 former IBM employees,
- World's Largest Business Software Company with World's Third-largest Independent Software Maker / Provider.
- ECC stands for Enterprise Central Component. The purpose of positioning it as ECC is to enable SAP to build and develop an environment of other products that can function upon the foundation of the central component. SCM (Supply Chain Management), CRM (Customer Relationship Management), PLM (Product Lifecycle Management), SRM (Supplier Relationship Management)
- SAP ECC 6.0 is latest production. Earlier versions of SAP are SAP R/2, SAP ECC 6.0, mySAP etc.

2. SAP ERP SELECTION

What Makes SAP different for Selection & Implementation to fulfill Manufacturing Industry Business Requirement?

SAP offers companies a comprehensive solution for managing financials, human resources, operations, and corporate services -- providing the most comprehensive SAP ERP product available today. It attempts to integrate all departments and functions across a company onto a single computer system that can serve all those different departments' particular needs. Traditional computer information systems used by many businesses today have been developed to accomplish some specific tasks and provide reports and analysis of events that have already taken place. Examples are accounting general ledger systems. Occasionally, some systems operate in a "real-time" mode that is, have up to date information in them and can be used to actually control events. A typical company has many separate systems to manage different processes like production, sales and accounting. Each of these systems has its own databases and seldom passes information to other systems in a timely manner. SAP takes a different approach. There is only one information system in an enterprise SAP.

3. SAP BUSINESS BENEFITS

- Increased sales, as a direct result of improved customer service. For some companies, the goal may be to retain sales lost to aggressive competition. In any case, the improved reliability of the total system means that sales are no longer lost due to internal clumsiness. In short, SAP ERP can represent a significant competitive weapon. Surveys of SAP ERP-using companies, I have verified improved customer service gains of 15 percent for all respondents; 26 percent for the companies who identified themselves as Class A. For most companies, better customer service means more sales.
- Increased direct labor productivity, resulting from the valid, attainable schedules which SAP ERP can enable companies to have. Productivity is increased via: Providing matched sets of components to the assembly areas, thereby eliminating much of the inefficiency and idle time often present. Reducing sharply the amount of expediting, lot splitting, emergency changeovers, short runs, and so forth in the fabrication areas. Survey results show respondents reporting an average productivity gain of 11 percent; the Class A users got 20 percent. Think of the value to the bottom line of that kind of productivity gain!
- Reduced purchase cost. SAP ERP provides the tools to give suppliers valid schedules and better forward visibility. Once the customer company gets out of the order-launch-and-expedite mode, its suppliers can produce the customer's items more efficiently, at lower cost. A portion of these savings can be passed back to the buying company to be used either for increased profits or reduced product pricing which can mean increased sales and profits.

- Reduced inventories. Effective demand management, planning, and scheduling result in valid schedules. Valid schedules mean matched sets of components, which mean making the products on schedule and shipping them on time. This typically results in lower inventories at all, or at least most, levels—raw material, work-in process, finished goods.
- Reduced obsolescence. from an enhanced ability to manage engineering changes, better forward visibility, and an overall smaller risk of obsolescence due to lower inventories in general. This is often a hidden cost at most companies and no one likes to focus on the stuff that is sold at discount or thrown away. However, it can be very large and certainly requires attention.
- Reduced quality costs. Valid schedules can result in a more stable environment, which can mean less scrap. Eliminating the end-of-the-month lump, where perhaps 75 percent of the shipments go out in the last 25 percent of the month, can lead to reduce warranty costs.
- Elimination of the annual physical inventory. If the inventory numbers are accurate enough for SAP ERP, they'll be more than good enough for the balance sheet. Many Class A and B companies don't take annual physical inventories. This can be a substantial savings in some companies. It can include not only the costs of taking the inventory itself but also the costs of disrupting production, since many companies can't produce while they count.
- Improved cash flow. Lower inventories mean quicker conversion of purchased material and labor costs into cash.
- Increased productivity of the indirect workforce. SAP ERP will help not only the direct production associates to be more productive but also the indirect folks. An obvious example is the large expediting group maintained by some companies. Under SAP ERP, this group should no longer be needed, and its members could be absorbed into other, more productive jobs.

4. SAP IMPLEMENTATION METHODOLOGY

- **Phases of Implementation**
 - **Phase 1- Project preparation:** This phase includes initial planning with kick off meeting and preparation. Project preparation and organization will be oriented to the business drivers, resources and potential benefits within company. This means that knowledge of any previous activities (for example, Project Charter Preparation functional specifications, preliminary study) and of the results of these activities is required. If necessary, we should decide on a consultant and how much consulting we need. Project Initiation includes - Determine consulting requirements, Check the status of any previous activities and their results, Pick the team (and their tasks) for project preparation, Determine the training requirements of this team, Complete training in the, contents and the tools for the 'Project preparation' work package,
 - **Phase 2 - Business Blueprint:** This function documents the business processes in your company that you want to implement in the system. You create a project structure in which relevant business scenarios, business processes and process steps are organized in a hierarchical structure. You can also create project documentation and assign it to individual scenarios, processes or process steps. You then assign transactions to each process step, to specify how your business processes should run in your SAP Systems. The Business Blueprint is a detailed description of your business processes and system requirements. You can print it out. You base all test plans that you create during test organization, on the Business Blueprint project structure. The objective should be to secure standard multidimensional reporting needs of end-users but also as a challenge to consider the integration of more advanced analytical business applications. The overall goal of the analysis is to deliver a comprehensive information model. This model intends to catch the requirements and serves as a blueprint for the later data design.
 - **Phase 3 - Realization:** Implement all business and process requirements based upon the business blueprint. The purpose of Phase 3 is to configure the ECC 6.0 System, in order to have an integrated and documented solution, which fulfills your business process requirements. In this phase, configuration of your system is carried out in two steps: Baseline and Final Configuration. The Baseline configuration is designed to configure about 80% of your daily business transactions and all of your master data, and organizational structure. The remaining configuration is done in process-oriented cycles. The Business Blueprint is used as the guide for the system configuration, done using the Implementation Guide, which will be described in detail in this chapter. After this, data transfer programs, as well as interfaces, need to be tested. As well as the configuration of an enterprise's organizational structure and business processes, one important task in Authorization role defining often used to be the job of the technical team, who had to quiz the staff as to the details of their business processes.

- **Phase 4 - Final Preparation:** Complete testing, user training, system management and cut-over activities. The purpose of this phase is to complete the final preparation of the ECC 6.0 System for going live. Key activities during this phase include the completion of user and administrator training as well as a final fine-tuning of the SAP Business One system. As part of final system tests, necessary adjustments are made to resolve all remaining critical open issues. Cutover activities are also completed during the Final Preparation phase. This includes testing, user training, system management and cutover activities, to finalize your readiness to go live. This Final Preparation phase also serves to resolve all crucial open issues. On successful completion of this phase, you are ready to run your business in your productive ECC 6.0 System. In Phase 4, your end users go through comprehensive training. In particular a going-live check is carried out and an ECC 6.0 Help Desk set up. This includes creating the user documentation and training the end users. The technical environment is installed for the productive system and the project managers make plans for going live, including the transfer of data from legacy systems and user support in the startup phase.
- **Phase 5 - Go-Live & Support:** Transition from implementation to production. This phase we are ready to go live with our productive system! Afterwards, the project team focuses on supporting the end users, for which training may not be completed. It is also necessary to establish procedures and measurements to review the benefits of your investment in ECC 6.0 on an ongoing basis. Key SAP Services to support you in this phase include - The Online Service System (OSS), Remote Consulting, and Early Watch Services. These services encompass a series of remote analyses of specific ECC 6.0 System settings, with recommendations for improving system performance. The last phase of the implementation project is concerned with supporting and optimizing the operative ECC 6.0 System, both the technical infrastructure and load distribution as well as the business processes. Activities such as the following are carried out: Production support facilities are defined, for example, checking system, Performance on a daily basis, Validation of business processes and their configuration, Follow-up training for users, Sign off, etc.
- **ASAP Implementation Phases Roadmap Overview** - Accelerated SAP methodology is a proven, repeatable and successful approach to implementing SAP solutions across industries and customer environments

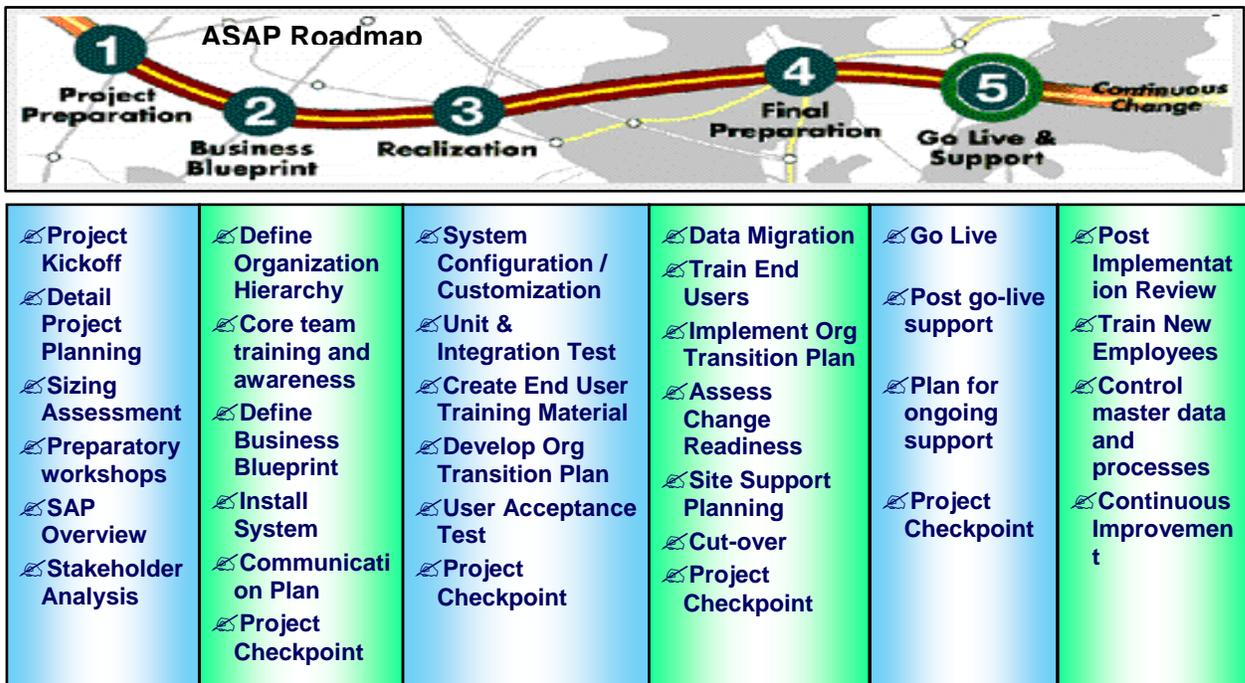


Figure 1: ASAP implementation roadmap is designed to support implementation project teams during their effort to plan, manage, and deliver implementation projects of SAP solutions.

5. SUPPORT MODEL (BEST PRACTICE FOR POST GO LIVE SAP SUPPORT MODEL)

Successful SAP ERP implementations hinge on getting the business side involved not only during the project but long after go-live, according to SAP customers.

- Level 1 Support – SAP Support Team - Core Team / Help Desk Team & IT Team
- Level 2 Support – Implementation Partner Support Team
- Level 3 Support – SAP Product Support

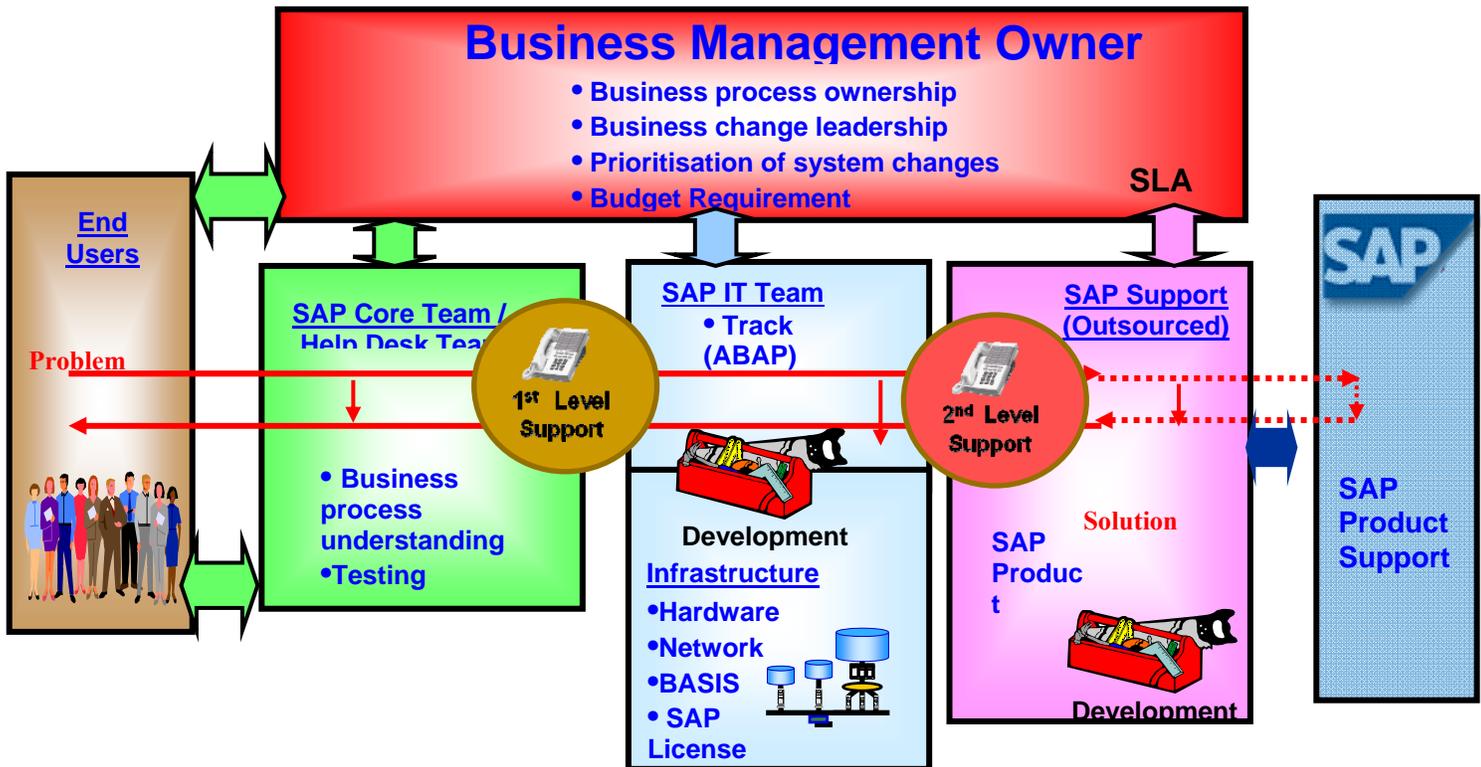


Figure 2: SAP Post Go Live Support Model maintains system availability and performance at a high level.

6. CHALLENGES OF SAP IMPLEMENTATION & POST GO LIVE SUPPORT

Maintaining good system performance and availability of followings - SAP Servers at Primary Data Center, SAP Servers at DR Data Center, Wide Area Network Connectivity, Power & Cooling at Data Centers, Reacting quickly to new demands for system enhancements, e.g. Process changes / enhancement, new reports, Managing SAP major upgrades and their costs. Controlling ongoing expenditure on external consultancy, total Life-cycle costs for SAP projects spanning multiple business units and instances, Experienced SAP people are in demands everywhere, so retaining experts who know how our process works and how our SAP packages have been configured to support them,

7. SAP ABAP DEVELOPMENT MODEL

- Transportation of New Programs, Configurations and Corrections

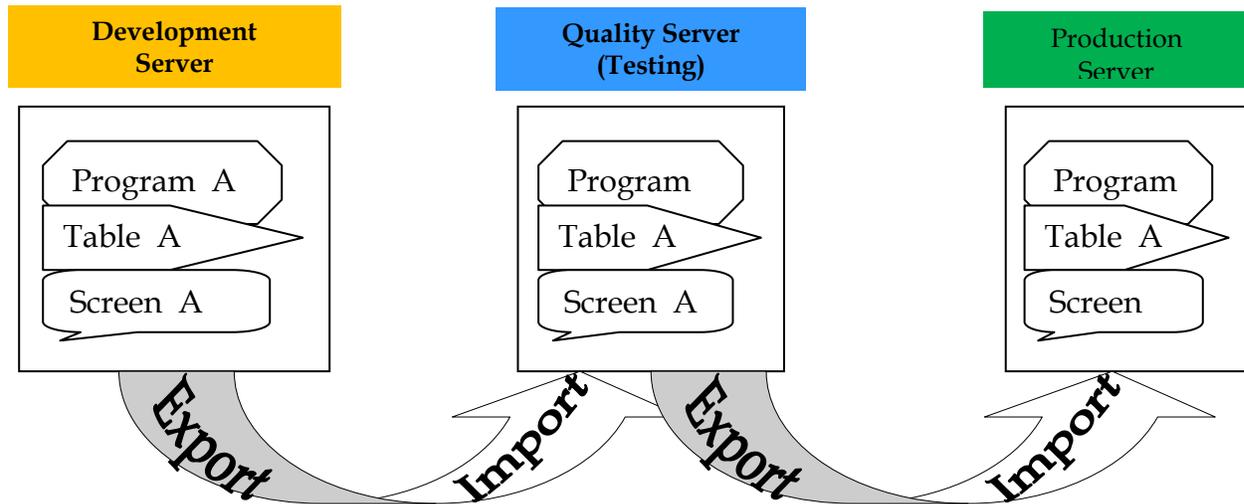


Figure 3: SAP ABAP Development Process Flow Model to support end users as per their Z requirements.

8. CONCLUSION & SCOPE

This study provides a schema of SAP ERP Selection, Implementation Phases & Post Go Live Support methodology together with an evaluation of their relevance. This is a relatively new concept in a single paper and only a little empirically supported research is available. Outsourcing skills from consultants came out as a widely accepted method in SAP ERP implementation. It was obvious from the results that in implementing SAP ERP systems firms faced more behavioral and management related challenges; such as the end user not being ready, resistance to change, lack of training, turnover of key project persons and lack of project planning, rather than pure technical glitches such as software bugs and configuration difficulties. However, no formally modeled methodology was used for evaluating technical and management consultants. Most of the respondents resolved to place more emphasis on the behavioral and management issues of implementation, and improving the business processes when asked about the lessons learnt from the project implementation. Interestingly, a company also found incompetent consultants as a major challenge in implementation. Further research will try to validate the found results using case study method and interviews with people of various roles involved in SAP Implementation projects. However, we are gathering the best implementation practice information provided by case studies, and not based upon theoretical assumptions. Finally, we intend to formalize ASAP Best Implementation Methodology relevance analysis and develop a general framework to analyze different aspect relevance in other manufacturing industries.

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DOES ORGANIZATIONAL TRAINING HELP FIRMS OPERATING AND COMPETING IN THE INNOVATION-BASED ECONOMY INNOVATE? A SURVEY OF TRAINING PROFESSIONALS

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ABSTRACT

Using the resource-based view of the firm (RBV) as theoretical foundation, this paper investigates the extent to which organizational training contributes to the innovation of firms operating and competing in the innovation-based economy. The present study also explores a relationship between the integration of training in the firm's business strategies and the extent to which organizational training contributes to the firm's innovation. A statistical analysis of the data obtained from a survey of 107 training professionals employed in small, medium, and large firms operating and competing in the innovation-based economy in different industries (service, retailing, and manufacturing) revealed that the majority of the participants perceived that organizational training contributed moderately, highly, or very highly to three measures of the firm's innovation as specified in this study. The results also indicated a statistically significant linear positive relationship, $r_s(97) = .566, p < .01$, between the participants' perceived involvement in the integration of training in their firms' business strategies and the extent to which organizational training contributes to their firms' innovation.

Keywords: Resource-based View of the Firm; Innovation, Training, Innovation-Based Economy

INTRODUCTION

Innovation “the application of new ideas to the products, processes or any other aspects of firm’s activities” (Rogers, 1998b, p. 5) has become one of the key drivers for firms to operate profitably and compete sustainably in the globally linked economies with rapidly evolving business models and environments. More fundamentally, innovation is the lifeline for firms to stay in business and competitive in the innovation-based economy. Porter and Stern (2002) asserted that firms operating in advanced nations whose economies were innovation-based would not obtain a sustained competitive advantage if they were not able to “create and then commercialize new products and processes and shift the technology frontier as fast as their rivals can catch up” (p. 2).

Companies in the innovation-based economy rely heavily on their strategic assets – employees’ skills and knowledge – to become innovative in order to attain a sustained competitive advantage (Porter, 2000). This notion is theoretically embedded in the resource-based view of the firm (RBV). The fundamental premise of the RBV states that companies gain a sustained competitive advantage through the usage of resources and capabilities that are valuable, rare, imperfectly imitable, and not substitutable to create value (Barney, 1991, 1995). The RBV argues that conventional sources – natural resources, technology, economies of scale, operational and manufacturing designs etc. – can be leveraged to gain a sustained competitive advantage; however, these sources can be easily modeled by other companies. This implies that any sources of sustained competitive advantage that cannot be conveniently imitated are crucial to the wellbeing and competitiveness of any companies. Notably the RBV establishes that people (human resources), the dynamic repository of knowledge and skills, can be employed to create value in a way that other firms find it difficult to imitate (Barney, 1991).

According to these researchers (Barney & Wright, 1998; Gorman, Nelson, & Glassman, 2004; Lopez-Cabrales, Valle, & Herrero, 2006; Shee & Pathak, 2005; Wright, McMahan, & McWilliams, 1994), employees, the bearers of knowledge and skills, were the most valuable and necessary asset for any firms to become innovative and generate a competitive advantage. Ultimately, in the context of corporate innovation, employees use their knowledge and skills with appropriate tools to deliver innovation through (a) improvement of the design and development of new products/services; (b) effective introduction of new products/services to the market; (c) effective introduction of new business processes; (d) improvement of current products/services; and (e) improvement of current business processes (Sum, 2010). Fundamentally speaking, a company may have the best strategic plan to become the leader of innovation in the industry, but it does not mean anything if its people lack appropriate and relevant knowledge and skills to successfully support and execute the strategic plan.

It is evident, at least at a conceptual level, that the ability for firms to become innovative is dependent on the knowledge and skills of their employees. One of the conventional methods for ensuring that both current and new employees possess necessary and relevant knowledge and skills to perform their jobs and to respond to eventual business opportunities and threats is [organizational] training. Research studies have conceptually and empirically established a positive linkage between training and innovation. For instance, there was a direct link between employee training and the ability of those employees to be innovative (Blundell, Dearden, Meghir, & Sianes, 1999). Baldwin (1999) performed a review of a number of Canadian studies and found a positive linkage between innovation and training. Baldwin and Johnson (1996) also reported that firms with high level of innovation provided training to a larger number of their employees. Moreover, Baldwin (2000) provided evidence of the important relationship between innovation, skills and training, and the success of start-up firms. By analyzing the data obtained from U.S. firms and their respective employees, Frazis, Gittleman and Joyce (1998) found that firms that had more innovative workplace practices had a tendency to offer more training. In addition, Dockery (2001) found that the proportion of employees receiving on-the-job training was positively associated with the firm's innovation. Turcotte (2002) found that "both classroom and on-the-job training, innovation in products, services and processes, and implementation of new technologies or new software were variables that were positively associated with support for training" (p. 22). A regression analysis performed by Porter and Stern (2002) revealed that staff training and the firm's innovation was very highly correlated, $r = .987$.

The problem of this study was to investigate the perception of training professionals employed in firms operating and competing in the innovation-based economy regarding the extent to which organizational training contributes to the firm's innovation. The present study was also set up to explore a relationship between the integration of training in the firm's business strategies and the extent to which organizational training contributes to the firm's innovation. Training, as one of the human resource practices, has been qualitatively and quantitatively established in literature to have a positive impact on organizational performance and competitiveness; nonetheless, the extent to which training is genuinely perceived and valued to be strategically important by the firm's top management is still questionable. The current study sought to contribute to a greater understanding of the impact of training on the firm's innovation. The following research questions were proposed to address the problem of this study.

Question 1: To what extent does organizational training contribute to the firm's innovation as perceived by training professionals?

Question 2: How do training professionals determine the extent to which organizational training contributes to the firm's innovation?

Question 3: Is there a statistically significant linear relationship between the training professionals' perceived involvement in the integration of training in their firms' business strategies and the extent to which organizational training contributes to their firms' innovation?

RESEARCH METHODS

Population and Sample Size

The target population identified in the present study was training professionals who interacted on the American Society for Training and Development (ASTD) discussion board located at <http://community.astd.org> and networked on Twitter, Facebook, and LinkedIn. The training professionals were identified as those whose jobs were related to training including, but not limited to, trainers, training specialists, training managers, training administrators, training supervisors, training directors, and training consultants. The present study utilized a convenience sample due to the fact that training professionals who interacted on the American Society for Training and Development (ASTD) discussion board located at <http://community.astd.org> and networked on Twitter, Facebook, and LinkedIn were conveniently accessible and technologically savvy. As of September 15, 2009, the population parameter of training professionals who interacted on the ASTD discussion board located at <http://community.astd.org> and networked on Twitter, Facebook, and LinkedIn was estimated at 6,450 (ASTD discussion board = 6,010; Twitter = 24; Facebook = 147; LinkedIn = 269). A minimum sample size (n) of the population (N) of 6450 training professionals, $n = N / [1 + N*(e)^2]$, was calculated using a 95% confidence level and $\pm 5\%$ confidence interval (e). Thus, the minimum sample size was calculated to be 376 ($n = 6450 / [1 + 6450*(0.05)^2] = 376$). To generate a higher response rate, a total number of 450 invitations soliciting participation

in the survey were initiated on the ASTD discussion board located at <http://community.astd.org>, Twitter, Facebook, and LinkedIn.

There were 107 responses in total. However, several responses contained some missing data. For instance, several responses contained missing data on some questionnaire items and had complete data on other items. Therefore, although several responses contained missing data, they were still included in the statistical analysis. The response rate was estimated at 23.77% -- total number of valid responses (107) divided by total number of invitations (450) multiplied by 100 -- $[(107/450)*100 = 23.77\%]$. While the response rate of 23.77% was considered acceptable since the average estimate of response rate for online surveys is between 20% and 30% (Hamilton, 2003), the results were subject to non-response bias (due to lower response rate). As a result, the comparison of the mean rating of each item of the first 20 responses and the last 20 responses was performed using the independent samples *t*-test. The mean ratings of each item of the first 20 responses and last 20 responses were not statistically different at .05 level. This implied that the first 20 responses and last 20 responses were similar and did not show any systematic differences that might cause any major concerns or red flags.

Research Instrument

The online questionnaire was developed by the researcher. The questionnaire consisted of six sections. The first section asked respondents to provide demographic data. The second section asked respondents to indicate types of training provided in their firms. The third section asked respondents to indicate training delivery formats adopted by their firms. The items found in the second and third sections were adopted from the 2008 industry report and exclusive analysis of the U.S. training industry (Bersin & Associates, 2008). The fourth section asked respondents to provide general information related to their firms. The fifth section of the instrument asked respondents if they were aware of the integration of training in their firms' business strategies. If they answered "yes", then they were asked to rate (5=Very High, 4=High, 3=Moderate, 2=Low, and 1=Very Low) their involvement in the integration of training in the firm's strategies. The sixth section asked respondents to rate (5=Very High, 4=High, 3=Moderate, 2=Low, and 1=Very Low) their level of agreement of the extent to which training contributes to measures of firm's innovation; the N/A option was also provided. In addition, respondents were asked how (on what basis) they determined the extent to which they perceived training to contribute to their firm's innovation. Finally, the sixth section provided respondents an optional comment text area should they have any comments or opinions to add to the questionnaire.

Validity and Reliability of the Data Collection Instrument

The extensive review of literature, input from the panel of experts, and feedback from participants in the pilot study were sufficient in establishing the data collection instrument validity. Based on data obtained from the actual survey, the calculation of the Cronbach's α (alpha) for the fifth section and sixth section was estimated at .930 and .876 respectively; these values were much higher than the acceptable value of .700.

RESEARCH RESULTS

Participants' Characteristics

A total of 111 responses were received (only 107 responses were usable); 48 (43.2%) and 63 (56.8%) were male and female, respectively. The largest age groups were 41-50 (34 or 30.6%) and 51-60 (30 or 27%) years old. In addition, 49 (44.1%) of the participants identified themselves as national members of the American Society for Training and Development (ASTD), and 48 of the participants were members of the ASTD's local chapters in 20 different U.S. states. Twenty-eight (25.2%) of the participants were training managers; 19 (17.1%) were training consultants; 17 (15.3%) were training directors; 16 (14.4%) were training specialists; 12 (10.8) were trainers; 8 (7.2%) were human resource managers; 5 (4.5%) were instructional design managers; and 6 (5.4%) were business owners. Forty-five (40.5%) of the participants indicated that they had worked for their current firms for more than 5 years. Finally, 56 (50.5%) of the participants held Master's degrees; 13 (11.79%) held doctoral degrees.

Characteristics of Participants' Firms

The participants' firms were grouped into three industries – service, retailing, and manufacturing. Seventy-four (66.7%) firms were service providers; 25 (22.5) were manufacturers; and 10 (9%) were retailers. The firms were categorized into three groups: small (100 or less employees), medium (101-1000 employees), and large (1001 or more employees). A large number of participants were employed in large-size firms (61 or 55%), 26 (23.4%) were employed in small-size firms, and 20 (18%) were employed in medium-size firms. Finally, 58 (52.3%) participants' firms were engaged in global operations.

Question 1: To what extent does organizational training contribute to the firm's innovation as perceived by training professionals?

As shown in Table 1, only 11 (9.9%) participants perceptually judged that training had a low contribution to the improvement of the design and development of their firms' new products/services (I1). Likewise, 9 (8.1%) participants identified that training had a very low contribution to the effective introduction of their firm's new products/services to the market (I2). Moreover, only 7 (6.3%) participants determined that training had a very low contribution to the effective introduction of new business processes in their firms (I3). Furthermore, 32 (28.8%) participants indicated that training highly contributed to the improvement of their firms' current products/services (I4). Finally 35 (31.5%) participants expressed that training contributed very highly to the improvement of current business processes in their firms (I5). The participants' mean ratings (based on a 5-point scale) of the impact of training on their firms' measures of innovation were 2.66 (for new product/service design), 2.87 (for introduction of new product/service to the market), 3.30 (for introduction of new business processes), 3.45 (for current product/service improvement), and 3.34 (for current business process improvement).

Question 2: How do training professionals determine the extent to which organizational training contributes to the firm's innovation?

In particular, a participant had an option to identify multiple bases regarding how he/she determined the extent to which organizational training contributed to each measure of the firm's innovation. The participants were most frequently based on their communication with colleagues and management team regarding their perception of the extent to which training contributed to their firms' measures of innovation.

Question 3: Is there a statistically significant linear relationship between the training professionals' perceived involvement in the integration of training in their firms' business strategies and the extent to which organizational training contributes to their firms' innovation?

As shown in Table 2, there was a linear positive relationship between the participants' perceived involvement in the integration of training in each of their firms' business strategies and the extent to which they perceived training to contribute to each measure of their firms' innovation. All of the relationships (except three correlation coefficients) were statistically significant at the .01 level.

In addition, the mean rating of each participant's reported involvement in the integration of training in their firms' combined generic strategies and growth strategies was calculated. Then the mean ratings of each participant's reported involvement in the integration of training in their firms' generic strategies as defined by Porter (1980) and growth strategies as defined by Ansoff (1957) were respectively calculated as well. Furthermore, the mean rating of the extent to which participants perceived training to contribute to all measures of their firm's innovation was computed. Then, the set of mean ratings of the extent to which the participants perceived training to contribute to all measures of their firms' innovation was correlated with the sets of mean ratings of the participants' reported involvement in the integration of training in their firms' Porter's generic strategies, Ansoff's growth strategies, and combined Porter's generic and Ansoff's strategies. The results are shown in Table 3. The correlation coefficients between the set of the mean ratings of the extent to which participants perceived training to contribute to all measures of their firms' innovation and the sets of the mean ratings of the participants' reported involvement in the integration of training in their firms' Porter's generic strategies, Ansoff's growth strategies, and combined Porter's generic and Ansoff's strategies were $r_s(95) = .536, p < .01$; $r_s(89) = .588, p < .01$; and $r_s(97) = .566, p < .01$, respectively. The correlation coefficients were statistically significant at the .01 level.

Table 1
 Participants' Rating of the Impact of Training on Measures of Their Firms' Innovation

Measures of Innovation	5 (Very High)		4 (High)		3 (Moderate)		2 (Low)		1 (Very Low)		N/A		No Response		Total		Mean (n)
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
	I1	25	22.5	16	14.4	19	17.1	11	09.9	17	15.3	19	17.1	04	03.6	111	
I2	31	27.9	19	17.1	16	14.4	09	08.1	10	09.0	22	19.8	04	03.6	111	100	2.87 (107)
I3	34	30.6	22	19.8	24	21.6	08	07.2	7	06.3	12	10.8	04	03.6	111	100	3.30 (107)
I4	31	27.9	32	28.8	24	21.6	03	02.7	8	07.2	09	08.1	04	03.6	111	100	3.45 (107)
I5	35	31.5	20	18.0	26	23.4	09	08.1	6	05.4	11	09.9	04	03.6	111	100	3.34 (107)
Crombach's α					.876												

Table 2
 Relationship between the Participants' Perceived Involvement in the Integration of Training in Their Firms' Business Strategies and Their Perceived Impact of Training on Each Measure of Their Firm's Innovation

Strategies	I1		I2		I3		I4		I5	
	n	r _s								
Differentiation	91	.39**	91	.43**	91	.40**	91	.51**	91	.36**
Cost Leadership	83	.38**	83	.37**	83	.36**	83	.36**	83	.28*
Focus	79	.45**	79	.53**	79	.43**	79	.42**	79	.33**
Market Penetration	70	.49**	70	.52**	70	.48**	70	.49**	70	.25*
Product Development	78	.51**	78	.48**	78	.35**	78	.51**	78	.28*
Market Development	67	.57**	67	.46**	67	.34**	67	.41**	67	.18
Diversification	72	.64**	72	.53**	72	.49**	72	.67**	72	.43**

Note:

I1 = Improvement of New Product/Service Design

I2 = Effective Introduction of New Products/Services to the Market

I3 = Effective Introduction of New Business Processes

I4 = Improvement of Current Products/Services

I5 = Improvement of Current Business Processes

n = Number of cases used in the correlation; **Correlation is significant at the .01 level; *Correlation is significant at the .05 level

Table 3
Relationship between the Participants' Perceived Involvement in the Integration of Training in Their Firms' Business Strategies and the Extent to which They Perceived Training to Contribute to Their Firms' Innovation

Strategies	The Firm's Innovation	
	n	r _s
Porter's Generic Strategies (Differentiation, Cost Leadership, and Focus Strategies)	95	.536**
Ansoff's Growth Strategies (Market Penetration, Product/Service Development, Market Development, Diversification Strategies)	89	.588**
Combined Porter's Generic Strategies and Ansoff's Growth Strategies	97	.566**

**Correlation is significant at the .01 level

CONCLUSIONS AND RECOMMENDATIONS FOR PRACTICE

The current study sought to contribute to a greater understanding of the impact of training on the firm's innovation. Using the resource-based view of the firm (RBV) as theoretical foundation, this paper investigates the extent to which organizational training contributes to the innovation of firms operating and competing in the innovation-based economy. The present study also explores a relationship between the integration of training in the firm's business strategies and the extent to which organizational training contributes to the firm's innovation. A statistical analysis of the data obtained from a survey of 107 training professionals employed in small, medium, and large firms operating and competing in the innovation-based economy in different industries (service, retailing, and manufacturing) reveals that the majority of the participants perceived that organizational training contributes moderately, highly, or very highly to three measures of the firm's innovation as specified in this study. The results also indicated a statistically significant linear positive relationship, $r_s(97) = .566, p < .01$, between the participants' perceived involvement in the integration of training in their firms' business strategies and the extent to which organizational training contributes to their firms' innovation. A few implications can be drawn from the findings of this study. First of all, training professionals need to improve their awareness of and involvement in the integration of training in various business strategies if they want to increase their strategic visibility, importance, and credibility in their firms. Secondly, top management and executives need to genuinely realize the strategic importance of the training function and training professionals as a value-added source for sustained competitive advantage by increasing the level of training professionals' involvement in the business strategies and having a structure that clearly aligns training activities with corporate objectives and goals. In addition, training professionals need to focus and rely on more objective and scientific evaluations in assessing the impact of training on their firms' competitiveness and business bottom lines if they want to stay relevant strategically and emphasize their strategic role and credibility in their firms. Finally, executives and top management teams need to integrate training and involve training professionals in every business strategy.

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ANALYSIS OF THE EFFECT OF HMDA ON NON-PRIME LENDING

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ABSTRACT

This cross sectional study focuses on the analysis of non-prime mortgage lending activities in specific geographic area in the light of the reporting requirements of the Home Mortgage Disclosure Act (HMDA). Using both qualitative and quantitative data from various sources, the study reveals that HMDA reporting requirements allowed the mortgage industry to conceal loans that had spreads of up to 3.5 points above the prime rate for Fixed Rate Mortgage or up to 5 points above the prime rate for Adjustable Rate Mortgage (ARM). This study of mortgage lending programs, products, and regulatory laws have also been examined to assess the impact of predatory lending on homeownership.

INTRODUCTION

The Home Mortgage Disclosure Act (HMDA) was enacted in 1975 by Congress to protect consumers and lenders. The Federal Reserve Board (FRB) implemented the HMDA through Regulation C to collect and examine mortgage data on home loans. The act requires lending institutions to provide public lending data to the Federal Financial Institutions Examination Council (FFIEC). The FFIEC segments the data into different categories for each Metropolitan Statistical Area (MSA). Since 1980, HMDA has gone through several changes (McCoy, 2007). Initial amendments focused on requiring the reporting of additional characteristics and included more lenders and financial institutions in the reporting requirements. Congress enacted the Home Ownership and Equity Protection Act (HOEPA) in 1994 to minimize abusive lending practices in the home-equity lending market. The HOEPA law addresses certain deceptive and unfair practices in home-equity lending covering primarily refinancing and home-equity installment loans. The law also empowered the FRB to change Regulations C to meet the requirements. In 1994, Regulation C was amended to make HMDA data available to the public earlier and improve the accuracy of the HMDA data as well as clarify and simplify the reporting requirements.

There have been several changes to Regulation C to increase disclosures through technological innovations and provide higher levels of analysis to protect lenders and consumers. For example, in 1997 the FRB, on behalf of the FFIEC, designed the HMDA Data Entry System Software. The explosion of non-prime lending during the period 2004–2007, forced the FRB to amend Regulation C to be in compliance with the amendments of Regulation Z (TILA) that defined “higher-priced mortgage loans”. Regulation Z’s final rule change came into existence in July 2008 to prohibit unfair or abusive lending practices. Later, the FRB published an amendment to Regulation C (HMDA) to revise the rules for reporting price information on higher-priced loans to conform to the definition of “higher-priced mortgage loan”. Under the amended rule, the lender is required to report the spread between the loan’s annual percentage rate (APR) and a survey-based estimate on APRs currently offered on prime mortgage loans of a comparable type if the spread is greater than or equal to 1.5 percentage points for a first-lien loan or 3.5 percentage points for a subordinate-lien loan, above the prime rate. The final rule’s effective date was October 1, 2009 and made the compliance mandatory for loan applications taken on or after that date or for loans that close on or after January 1, 2010. Additional characteristics, i.e. amortization type (fixed versus adjustable) are required to be reported. The purpose of this study is to analyze the HMDA data for the period 2004 – 2006 for selected MSAs to understand the non-prime mortgage activities given the disclosure requirements.

LITERATURE REVIEW

Rosenbaum (1996) analyzed mortgage data from an ethnicity and income perspective for the New York-New Jersey-Long Island metropolitan area. These findings suggested that the Black and Hispanic families were less likely to live or own in high-quality housing units and neighborhoods than white families. Canner, Passmore and Laderman (1999) examined non-prime and prime lending trends in the 1990s. For the period 1993 and 1998, the authors found that non-prime home loans accounted for 17 percent of the overall growth in home lending. However, the growth rate varied significantly among lower income neighborhoods and predominantly minority population neighborhoods with non-prime lending growth rates of 26 percent and 36 percent. Calem, Gillen and Washter

(2003) conducted a study about the neighborhood distribution of non-prime mortgage lending focusing on Chicago and Philadelphia. The research findings noted that in both cities nearly 50% of the growth in non-prime lending was due to an increase in African-American homeownership. The African-American borrowers had a relatively higher likelihood of obtaining a non-prime loan. Less-educated persons were also found to turn to non-prime mortgages due to their lack of knowledge and financial sophistication. Calem, Hershaff and Wachter (2004) expanded their research to include seven cities in designing a model of prime versus non-prime loan allocations in 1997 and 2002. The authors focused on studying the effect of neighborhood racial and ethnic composition on the likelihood of receiving a non-prime loan. The findings revealed that the individual's race, ethnicity, and income were significant in subprime borrowing.

Reade (2006) presented a summary for the New England MSA describing the impact of HDMA on loan activities focusing on traditionally underserved populations categorized as LMI households and minorities. The findings suggested that the overall lending activity increase in recent years had been driven primarily by increasing the volume of applications from LMI and minority households and that the gap between whites and minorities (Blacks and Hispanics) widened both in originations and denial rates. The gap was even wider for LMI families as compared to higher income levels. Shiller (2007) attempted to analyze recent trends in home prices and home ownership in order to forecast future home prices and determine the impact on the local economy. The author concluded that it is probable that we may see large real price decline of residential homes extending over many years in major cities that have seen large increases.

Bostic and Lee (2008) examined the question of whether the promotion of the home ownership strategy for building wealth among LMI families through various policies was a prudent decision. The decision was further analyzed by examining the net benefits of home ownership. The benefits were categorized into; the importance of down payments, housing price appreciation, and mortgage instrument risk. Since LMI households are unlikely to manage the resources to provide an adequate down payment, the mortgage instrument risk was found to result in the distress of managing monthly payments, delinquencies, and eventually foreclosures. Bocian, Ernst and Li (2008) examined whether race and ethnicity of the borrower played any role in non-prime loan pricing by analyzing 2004 HMDA data and a proprietary database of securitized non-prime loans. The authors conducted statistical analysis to ascertain whether conforming to conventional mortgage guidelines had any impact on mortgage prices. The findings showed that the minority borrowers were more likely to get higher-rate non-prime mortgages than non-Latino white borrowers.

RESEARCH METHOD

This study uses both qualitative and quantitative research methods for analyzing data available from various sources. These sources include studies and data from the Mortgage Banker Association (MBA), FRB, and FFIEC. The qualitative premise of the study synthesizes authentic research material available for the study group in published research conducted by financial institutions and academicians. The research done by financial institutions are available through the FRB, the MBA, and Loan Performance and HMDA websites. The quantitative aspect of the study requires mathematical and statistical analyses to address the research question using aggregate data from the HMDA website for a three year period (2004 - 2006). The data prior to this period does not meet Regulation C and Regulation Z reporting requirements. The aggregate data includes information on loans sold by the characteristics of borrowers; pricing information for first lien loans; dispositions of loan applications for the Federal Housing Administration (FHA), the Veterans Administration (VA), and conforming programs. The mathematical and statistical analyses included data segmentation, summarization, averages, percentages, and trends analysis. The study further compares the performance of home purchases by categories (minority, ethnic and LMI families) as defined by HMDA in Washington, DC, Richmond and Virginia Beach, Virginia MSAs to the national trends.

We examined mortgage loan data for the study group in Richmond (RICH) and compared closely with the corresponding data in two selected MSAs of Virginia--(1) Virginia Beach-Norfolk-Newport News (VA BCH) and (2) Washington-Arlington-Alexandria (WASH). The data has been analyzed and compared to assess the impact of mortgage lending activities on the study groups. Additionally, the trends have been compared with the national averages.

The analysis shows that the percentage of mortgage loans by number of loans increased in the selected MSAs for the minority group. The percentage increase from 2004 - 2006 in minority share of loan originations by loan count

increased in Richmond (4%), VA Beach (5%), Washington MSA (7%) and Nationally (1%) while the increase by dollar volume in Richmond was (2%), VA Beach (4%), Washington MSA (9%) and Nationally (2%). The percentage increases, in volume by count as compared to volume by amount, suggests that number of borrowers from the minority group increased during the period of study. However, Richmond exhibited slower growth than the selected MSAs.

Our analysis shows that the percentage of mortgage loans by number of loans increased in the selected MSAs of Virginia for the ethnic group. The percentage increase from 2004 - 2006 in minority share of loan originations by loan count increased in Richmond (1%), VA Beach (0%), Washington MSA (4%) and Nationally (2%) while the increase by dollar volume was Richmond MSA (1%), VA Beach (0%), Washington MSA (4%) and Nationally (3%). The percentage increases, in volume by count as compared to volume by amount, suggests that number of borrowers from minority group increased for Richmond during the period of study while other MSA did not exhibit similar trend. A comparison of the mortgage activity in various MSAs and with the national averages shows that the percentage of mortgage loans by number of loans increased in all selected MSAs of Virginia and nationwide averages for the LMI group.

The study shows that the share of non-prime loans increased for Private Securities (PSEC) and Commercial Banks, Insurance, and Affiliates (CBIA) lender types from 3% and 38% in 2004 to 20 % and 41% at the cost of Government Securities Enterprise (GSE) and other lender types whose share dropped from 3% and 56% in 2004 to 3% and 36% in 2005. The combined effect on the lenders share in 2005 resulted in a gain of 20% by PSEC and CBIA lenders at the expense of GSEs and other lenders in Richmond for all non-prime lending. The trends continued in 2006 and were comparable to the national trends.

The trend of percent share of non-prime lenders by dollar value of mortgages was reviewed by lender category for Richmond. The trend for the percent share by dollar value of mortgages is similar to that of the percent share by number of loans where the share of PSEC and CBIA increased at the cost of the other lender types primarily. The total gain of 24% from a combined share of 37% for PSEC and CBIA lender types in 2004 to 61% in 2005 was from the other lender category in Richmond. The trend continued into 2006 and remained comparable to the nationwide averages.

	Richmond MSA	VA Beach MSA	Washington MSA	All MSA
2004	11	41	31	4,049
2005	147	161	250	13,772
2006	5	12	27	1,354

The aggregate data for HOEPA status loans, i.e., high-cost loans, extracted from the HMDA website (Table 1), shows the number of such mortgages in Richmond, in selected MSAs in Virginia, and in all MSAs nationwide. In terms of number of loans, lenders in the other category played a major role financing HOEPA status loans in the study period for each MSA group considered for the study. However, in 2004, Richmond MSA/MD had more GSE financed HOEPA mortgages than the remaining lender types. HOEPA status mortgages surged 3 to 10 times to their highest level, during 2004 – 2005 period, in each MSA of the study group. These mortgages dropped to their lowest levels in 2006 for each MSA group of the study. In terms of dollar value of HOEPA status loans, Table 2 shows, once again, that the lenders in the other category provided most of the financing during the study period in each MSA of the study.

	Richmond MSA	VA Beach MSA	Washington MSA	All MSA
2004	\$1,002	\$5,235	\$8,068	\$627,969
2005	\$18,543	\$22,035	\$64,741	\$2,060,854
2006	\$510	\$1,897	\$6,280	\$223,012

The CBIA lender category followed the other category in supplying the funding for HOEPA status loans nationwide. The dollar value of HOEPA status loans surged during 2004 – 2005 while dropping to their lowest levels in 2006. The impact of non-prime lending for Richmond is studied by lender categories – GSE, PSEC, CBIA, and other for

first liens only. The trends by lender category have been close to national trends. Since GSEs provide more risk disclosures and satisfy more demanding capital stress tests than PSEC, CBIA, and other lender categories, therefore, the non-prime share of GSEs was the lowest (3%-6%) among all lender types. The growth in non-prime lending during the study period is attributed to very aggressive efforts of non-prime lenders which are grouped in the PSEC category. Non-prime lending has been exhibited in CBIA and Other categories as well that represented an evolution of the credit markets towards efficiency and maximum utilization of consumer deposits to reap maximum profits.

The analysis of HOEPA status loans reveals that Richmond experienced similar growth and decline in such loans consistent with the remaining MSAs of the study group and nationwide. The growth of HOEPA status loans prompted a public backlash against predatory lending practices of mortgage lenders. Regulation Z strengthened the mortgage lending laws against predatory lending and was instrumental in the decline of HOEPA status loans. Due to tremendous growth in non-prime lending activities, there has been some impact on the delinquencies and foreclosures in Richmond. A recent monthly trend from August 2007 to April 2008, has been studied to compare and contrast the findings for Richmond with the selected MSAs of Virginia and national trends.

The trends in the delinquencies of non-prime mortgages, which include those mortgage loans where the borrower is 90 days or more behind in payments. The trends show that the delinquencies of non-prime mortgages in Richmond increased from 6.44% in August 2007 to 9.87% in April 2008. In comparison, the delinquencies for VA BCH area and national averages were below Richmond, starting at 5.45% and 5.98% in August 2007 and growing to 9.36% and 8.93% in April 2008 respectively. However, the trend for WASH area shows that the delinquencies increased from 6.40% in August 2007 to 11.52% in April 2008 and were considerably higher than Richmond. With the exception of WASH and VA BCH area, which showed a slight month-to-month decline from January 2008 to February 2008, all MSA/MDs selected for Virginia and the national trends showed a month-to-month increase in the percent share of delinquencies.

The foreclosure trends for the 9-month period, from August 2007 to April 2008 increased from 6.23% in August 2007 to 10.23% in April 2008. These foreclosure percentages of non-prime loans were the highest for this period as compared with all MSAs selected for Virginia. The foreclosures increased from August 2007 to April 2008 period for WASH, from 4.03% to 7.58% in March 2008 and dropping down to 7.31%; for VA BCH, from 1.78% to 3.92% in March 2008 and dropped down to 3.74%; and for RICH, from 2.33% to 3.90% in February 2008 and dropping down to 3.59%. Richmond had the lowest percent of non-prime delinquencies in April 2008 in comparison to the selected MSAs of Virginia and corresponding U.S. national averages. April 2008 period for WASH, from 4.03% to 7.58% in March 2008 and dropping down to 7.31%; for VA BCH, from 1.78% to 3.92% in March 2008 and dropped down to 3.74%; and for RICH, from 2.33% to 3.90% in February 2008 and dropping down to 3.59%. Richmond had the lowest percent of non-prime delinquencies in April 2008 in comparison to the selected MSAs of Virginia and corresponding U.S. national averages.

The analysis of delinquencies and foreclosures for Richmond brings some insight into the impacts of mortgage lending including non-prime loans due to limited reported data by mortgage lenders. Delinquencies for Richmond have been higher than the national averages and VA Beach, but lower than Washington. The result of higher delinquencies is attributable to non-prime lending, where most of the loans were originated with the lowest monthly payments and with increased frequency of resetting monthly payments in subsequent years. However, unemployment rate and demographic mix did not change significantly and appear not to have impacted adversely the delinquencies. The analysis of foreclosures for Richmond reveals contrary results to delinquencies where foreclosures have been the lowest in 2008 as opposed to national and Washington foreclosure trends. However, the lowest foreclosure rate in 2008 is not necessarily limited to the loans that were originated during the study period, 2004 – 2006, in Richmond.

CONCLUSIONS AND RECOMMENDATIONS

The study of different mortgage lending programs and products reveals that all programs and products have been equally available to all borrowers in all MSAs. The qualifications of mortgage lending, including the lending limits for FHA, VA, conforming and non-conforming loans, as well as regulatory and statutory requirements were similar to most of the MSAs. Borrowers benefited from the interest rate spread between Fixed Rate Mortgage and Adjusted Rate Mortgage products and the prevailing interest rates in choosing from various mortgage products during the study period. The study from the perspective of minority, ethnic, and LMI groups shows that Private Securitization

(PSEC) grew dramatically not only by the number of loans but also significantly by the dollar amount. The increase in PSEC and GSEs loan originations affected mortgage lending in several ways, such as, increasing non-prime lending, boosting home prices, and undermining mortgage industry regulations. Since GSEs require more risk disclosures and satisfy more demanding capital stress tests than PSEC, CBIA, and other lenders, therefore, the non-prime share of GSEs was the lowest among all lender types. The HOEPA requirements exposed high cost loans that prompted a public backlash against predatory lending practices of mortgage lenders. Regulation Z strengthened the mortgage lending laws against predatory lending and was instrumental in the decline of HOEPA status loans in 2006.

Since lenders were not required to report loans that had spreads of up to 3.5 points above the prime rate for Fixed Rate Mortgage or up to 5 points above the prime rate for Adjustable Rate Mortgage, the majority of non-prime loans were blended in all lender categories. The presence of non-prime loans in all categories is well supported by the evidence of increased delinquencies and foreclosures in subsequent years. The majority of growth in PSEC lender category for the study groups also suggests that the study group preferred private lenders over GSEs for their mortgage needs due to lower borrowing qualifications as well as lower mortgage lending rates. The authors intend to focus on further a study that require delinquencies and foreclosure data in subsequent years for the loans originated during the period of this study. The recent revisions in Regulation Z has narrowed the spread above prime for identifying non-prime loans. This provision offers further research opportunities to assess the impact on non-prime lending. Mian and Sufi (2008) suggested that greater securitization of non-prime mortgages leads to house price appreciation. This assertion provides a basis for further research to validate or contradict their findings in the light of recent amendments of Regulation Z. The trends of recent mortgage lending activities and loan servicing data, will also allow researchers to ascertain why some lending institutions did better in recent housing market than other lenders.

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ANALYSIS OF MARKET SEGMENTATION FOR POLYMER PRODUCTS IN INDIA

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ABSTRACT

The purpose of this research paper is to evaluate market segmentation of polymer products in India. This study focuses on identifying relevant market segments for polymer products and to provide suggestions to target the identified market segments. The present study focuses on how market segmentation theory has been used as a tool by management of Indian Oil Corporation to capture the Polymers market in India.

INTRODUCTION

Presently there are about 22000 plastic processing units of which about 75% are in the small scale sector.¹ The small scale sector accounts for only about 25% of polymer consumption. The plastic processing industry's consumption of virgin polyolefins is estimated at 2.95 million tonnes. The industry also consumes recycled plastic, which constitutes 30% of total consumption. The capacity utilization of the processing industry is estimated to be around 50%. However, the degree of fragmentation, worldwide, is large and despite the small size of operations of the players, they are able to operate profitably. The sector has a significant presence of the unorganized sector, which accounts for more than 70% of the industry turnover. More than 95% of the firms in the industry are either partnership, proprietorship or private limited companies. Further, these small companies get significant advantages in taxes. These firms, thus, provide significant level of competition to the organized sector companies, which combined together were making losses. The organized sector companies, thus, need to build up significant brand image to survive against the competition from the unorganized sector. The key organized sector players include Nilkamal Plastics Limited and Supreme Industries Limited.

The top 312 players (that consume above 1000 tpa of polyolefins annually) consuming polyolefins accounts for around 50% of the industry turnover. They are the targets for the direct sales. The top 140 woven sacks players account for 77% of the woven sacks' industry turnover. While woven sacks industry is dominated by medium scale players, other segments and grades have presence of small scale and unorganized sector. In the international market, the key success factors for a plastic processing firm are the cost of production, brand image and the variety of products that it can produce. The favorable factor for the Indian plastic processing industry is the availability of skilled and cheap manpower. However, the Indian plastic processing companies are significantly smaller in size compared to their global counterparts. This is on account of the fact that many products are reserved exclusively for the small-scale sector.

The western region comprising Gujarat, Maharashtra, Daman and Silvassa accounts for nearly half of the overall consumption of polyolefins in the country. A large number of companies have corporate offices in Mumbai (and Delhi) with factories located in Daman and Gujarat (Haryana and Noida). Indian petrochemical industry is concentrated among few players. Reliance along with its 51% subsidiary IPCL accounts for two third of the entire industry. GAIL is the other major player and Haldia Petrochemical post restructuring has also become a main stream player. Petrochemicals are useful chemicals obtained from light olefins (mainly ethylene), naphta based crackers have a higher share of propylene and aromatics (benzene and xylenes). While India can boast of having a significant number of steam crackers (both naphtha and natural gas based), it has only one world class aromatics unit – the one set up by RIL at Jamnagar in Gujarat.

Porter's model:

Analytical profile of Indian plastic processing industry

Threat of substitutes: (small to medium) Plastics have better cost to weight ratio than their substitutes. Thus plastic allow better performance than substitutes in most applications. However, plastics are non-biodegradable. So, environmental concerns persist.

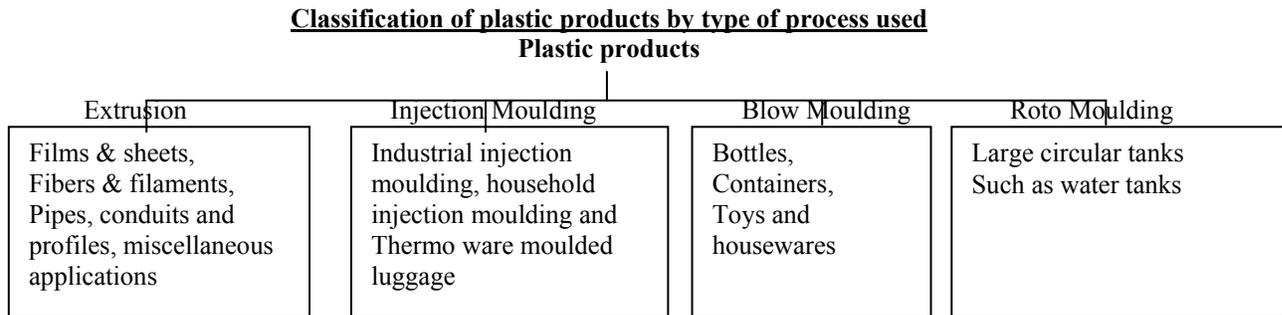
Bargaining power of suppliers: (medium to high) Few domestic suppliers. However, their prices are marked to landed costs.

Inter firm rivalry: (high) Dominated by small scale units. Nearly 20000 units are present in the industry which results in very high level of competition.

Bargaining power of buyers: (medium to high) Buyers are either goods manufacturing companies (for packaging their goods) or consumers/companies (for articles), both of whom have some ability to exercise control over the plastic processing companies.

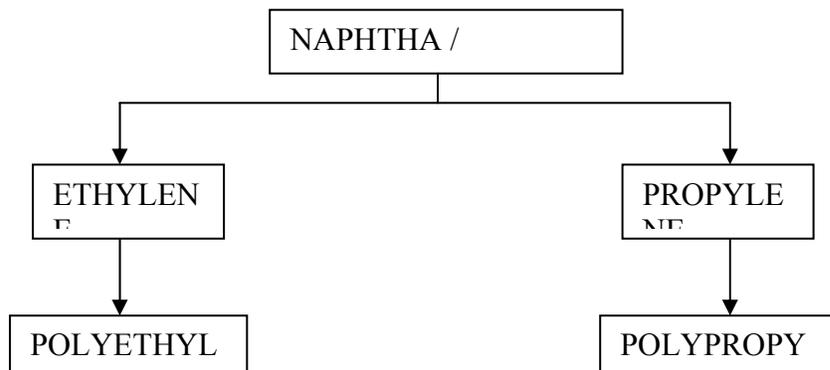
Barriers to entry: (low) Belong to small scale thereby indicating lower entry barriers. Building brand image is important in certain items.

On the basis of value added, the plastic products sector contributes to around 0.5% of GDP of the country. The plastic products sector also provides around 1% of the country’s exports. There is a large presence of small scale companies in the industry which account for more than 25% of the industry turnover. An estimated Rs 100 billion is invested in the form of fixed assets in the plastic processing industry. To manufacture finished products, polymers are processed through various types of techniques namely extrusion, injection moulding, blow moulding, and roto-moulding, various products produced through these processes are highlighted in the following exhibit.



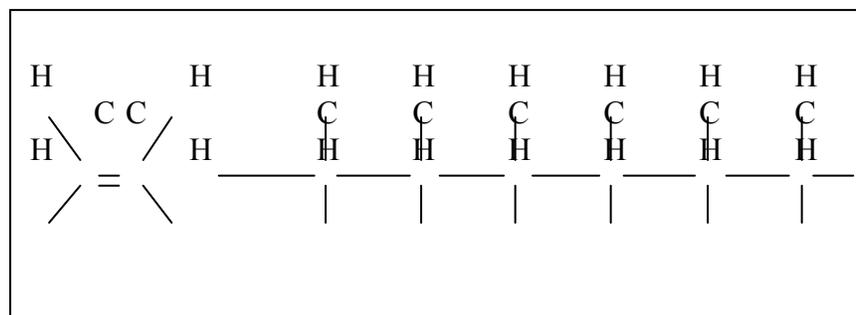
While cost and quality are the most important parameters for plastic processors, the primary survey of nearly 700 processors shows that reliability of timely supplies. Overall, service as characterized by on-time delivery, technical support, salesman interaction, delivery lead time, marketing assistance, flexible ordering, technical advice, dispatch information and accounts settlement is equally important as price and quality.

PRODUCTS FROM STEAM CRACKER



POLYMERS

Polymers are macromolecules built up by the linkage of large number of much smaller molecules. The small molecules that combine with each other to form polymer molecules are termed monomers and the process by which they combine is termed as Polymerization. There may be hundreds and thousands of monomer molecules linked together in one polymer molecule.

Polymer Structure ²

Polymers account for 70% of the petrochemicals. Polymers are known as building blocks of plastics. Many common classes of polymers are composed of hydrocarbons. These polymers are specifically made of small units bonded into long chains. Carbon makes up the backbone of the molecule and hydrogen atoms are bonded along the backbone. There are polymers that contain only carbon and hydrogen; other elements can also be involved. Oxygen, chlorine, fluorine, nitrogen, silicon, phosphorous and sulphur are other elements that are found in the molecular makeup of polymers. Polyvinyl chloride (PVC contains chlorine). Nylon contains nitrogen. Teflon contains fluorine. Polyester and polycarbonates contain oxygen. There are also some polymers that, instead of having a carbon backbone, have a silicon or phosphorous backbone. These are considered inorganic polymers. One of the most famous silicon-based polymers is Silly Putty.

Although, by global standards, Indian polymers (the key petrochemical product) demand is small, it is increasing at a very fast rate. In the past, because of higher GDP growth and higher presence of traditional materials India has shown a significantly higher growth rate in polymer consumption in the last five years. The growth rate in Indian polymer consumption is even higher than China and other key Asian Economies.

CHARACTERISTICS OF POLYMERS –

Polymers are divided into two distinct groups: thermoplastics and thermo-sets. The majority of polymers are thermoplastic, meaning that once the polymer is formed it can be heated and reformed over and over again. This property allows for easy processing and facilitates recycling. The other group, the thermo-sets, cannot be re-melted. Once these polymers are formed, reheating will cause material to scorch.

Every polymer has very distinct characteristics, but most polymers have the following general attributes:

- ✓ Polymers can be very resistant to chemicals. Consider all the cleaning fluids in your home that are packaged in plastic. Reading the warning labels that describe what happens when the chemical comes in contact with skin or eyes or is ingested will emphasize the chemical resistance of these materials.
- ✓ Polymers can be both thermal and electrical insulators. A walk through your house will reinforce this concept, as you consider all the appliances, cords, electrical outlets and wiring that are made or covered with polymeric materials. Thermal resistance is evident in the kitchen with pot and pan handles made of polymers, the coffee pot handles, the foam core of refrigerators and freezers, insulated cups, coolers and microwave cookware.
- ✓ Generally, polymers are very light in weight with varying degrees of strength. Consider the range of applications, from toys to the frame structure of space stations, or from delicate nylon fiber in pantyhose or Kevlar, which is used in bulletproof vests. Polymers can be processed in various ways to produce thin

fibers or very intricate parts. Plastics can be molded into bottles or the bodies of cars or mixed with solvents to become adhesive or paint.

The carbon-to-carbon bonding mechanism that holds polymers together is also a weak link that can cause the early failures of these materials. Ultraviolet light and other forms of energy can break the weaker double triple bond, resulting in a change in engineering properties. The properties of plastics can be modified with the addition of fibres, fillers, ultraviolet light stabilizers, coloured pigments and flame retardants. Fibres can increase strength, fillers can decrease creep, and pigments can absorb ultraviolet light from the sun and improve exterior weathering. Polymer blends can also be used to improve some performance characteristics.

Filled and reinforced plastics are referred to as composites or laminates. Laminates are produced using multiple layers of fibre reinforced resin, or layers of different polymers (sometimes referred to as dual laminates) to take advantage of the beneficial attributes of each material. For instance, reinforced polyester has good mechanical strength, but poor resistance to sodium hypochlorite. Polyvinyl chloride (PVC), on the other hand, has good resistance to sodium hypochlorite. An internal liner of PVC with an outer shell of reinforced polyester takes advantage of the good properties of both relatively inexpensive plastics to fabricate a tank or stripper unit. There are many examples where one material is either unsuitable or too expensive for a given application, whereas, components with a combination of plastics competes with the more expensive alloy metals, such as stainless steel or titanium.

Advantages of polymers over substitutes

Versatility:

Plastics can be formed into a huge variety of complex shapes, providing design solutions for thousands of applications. They can be rigid or flexible, solid or fibrous. Consider the difference between a car bumper, a telephone, a plastic pipe and a plastic bag to see the sort of variety that exists.

Lightweight:

Plastics are very light, and that provides a number of advantages. For instance, the amount of raw material consumed is less, energy requirement for the production process is low, handling/ carrying becomes easier, lesser fuel consumption & decreased air pollution in transportation & less waste is generated during the whole process.

Safety:

Plastics provide hygienic and protective solutions. Although they are lightweight, plastics are also extremely strong that means they can be used in the most demanding conditions. As they are shatterproof and can be made almost unbreakable, plastics are widely used in areas where safety is of utmost importance (for instance, food and drink packaging, healthcare and transport).

Durability:

Plastics provide durable and tough solutions. They do not corrode or decompose with the passage of time. This durability means they are ideal for long-life applications like building and transport, where maintenance can, as a result, be kept to a minimum (eg. Exterior or underground water and gas pipes and cables, which can last over 40 years in some cases, car bumpers, radiator grills, light fittings). Plastics can withstand most weather conditions as well as absorb impact through knocks and bumps, making them ideal in these applications.

Cost efficiency:

Plastics provide cost effective solutions in their production and use by reducing energy in manufacture, making fewer components necessary in production, or by lighter weight, thus reducing fuel consumption in delivery.

Chemical resistance:

Consider all the cleaning fluids in a home that are packaged in plastic. Reading the warning labels that describe what happens when the chemical comes in contact with skin or eyes or is ingested will emphasize the chemical resistance of these materials.

Thermal and electrical insulators:

A walk through the house will reinforce this concept, as one considers all the appliances, cords, electrical outlets and wiring that are made or covered with polymeric materials. Thermal resistance is evident in the kitchen with pot and pan handles made of polymers. Just as coffee pot handles, the foam core of refrigerators and freezers, insulated cups, coolers and microwave cookware. The thermal underwear that many skiers wear is made of polypropylene and the fiberfill in winter jackets is acrylic.

Environmental protection:

The plastics industry has invested much time, effort and money to ensure that the impact of plastics on the environment is kept to a minimum. Environmental impact must be measured over the whole life of a product – from production to disposal of the final remains. In this respect, plastics make the most of its resources.

PLAYERS

The Indian basic petrochemical manufacturers are integrated from basic petrochemical to polymers, manmade fibres, fibres intermediates and downstream petrochemical production. Non integrated players are present in production of polyvinyl chloride, polystyrene, manmade fibres and products such as phenol, linear alkyl benzene, phthalic anhydride etc. In India, refinery petrochemical is limited and historically, the public sector oil refining companies have sold their petroleum feedstock to other companies which have been adding value and converting feedstock to useful petrochemical products. Further, a significant portion of feedstock has remained un-extracted and has been sold along with other fuel products. However, RIL's Jamnagar refinery extracts significant petrochemicals from its petroleum products.

The Indian polymers market is dominated by local players, with the foreign stakeholding in Indian polymers plants restricted to Haldia Petrochemicals Limited (HPCL), BASF Styrenics India Private Limited (BSIL), and LG Polymers Limited. HPL is a joint sector company in which Chatterjee Petrochem, Mauritius, has a 43% stake along with the West Bengal Industrial Development Corporation. As for BSIL, it is a 100% subsidiary of BASF AG, a multinational chemicals company and the world's second largest PS producer, while LG Polymers is a wholly owned subsidiary of the LG Group, South Korea. The production of polyethylene and polypropylene in India is accounted for almost in their entirety by companies with integrated petrochemical complexes. Such companies are Reliance Industries Limited (RIL), Indian Petrochemicals Corporation Limited (IPCL), Haldia Petrochemicals Limited (HPL), and Gas Authority of India Limited (GAIL).

Key issues facing the players

SSI Reservation

The Government still continues to reserve many plastic products for the small-scale sector. The small-scale sector accounts for more than 50% of the industry turnover. There are still more than 60 categories of products, which come under the purview of SSI reservation. The list includes soap cases, buckets, cups, water jugs, plastic cane, mugs, flexible PUF products, PS foam products, upto 110 mm dia PVC pipes, woven sacks not manufactured on circular looms, rain coats, polyester sheets, thermowelded plastics products, extrusion blowmoulded articles less than 5 litres capacity, monofilaments, tubular PP films and many more. The SSI reservation not only prevents the larger sized firms from entering the sector, but also stops the small firms from growing (lest they would also not be able to enjoy incentives). The firms obviate from the law by setting up of more firms under their own ownership rather than expanding themselves. Notably, the higher size of a firm leads to better financial performances as more than 85% of the conversion cost (difference between the finished goods sales and the raw material costs) is of the fixed nature.

The future performances of the organized sector would critically hinge upon the removal of reservation policy of GoI towards Small Scale Sector Industries (SSIs). The rationale for the removal of plastic products from the list of products reserved for SSIs draws from possible economies of scale, use of modern technology and better ability of larger firms to export and compete with imports. Recognizing this, committees setup by Government of India to review the policy regarding SSIs, have suggested removal of plastic products from the list of items reserved for SSIs. The Government has been removing products from the SSI reservation list albeit gradually and in a phased manner. However, many items still continue to be reserved.

Plastic Processing Capacity

The total number of plastic processing machines installed in the country is in the range of 65000 machines with around 55% being injection moulding machines. Overall, these machines could process more than 8.0 million tonnes of polymer resins. With total resin processed around 5.5 million tonnes (including recycled polymer and waste), the capacity utilization can be calculated to be around 65%. The low capacity utilization is an industry feature allowing for possible downtime of the machines. However, its still too low and indicates significant over-capacity in the industry.

Exports of plastic products

Amongst various plastic products – films, plates and sheets account for largest share of 40%. Plastic products for packaging (apart from films etc.) account for a share of 27% which includes woven sacks that account for 13% of the total product exports. Though Indian exports of plastic products have increased over the past decade, Indian exports of plastic products, however, still continue to account for a minuscule share in the world trade (only around 0.47%). The low presence of the organized large-scale sector and consequently, low economies of scale prevent Indian players from becoming cost competitive in the international market.

Imports of Plastic Products

As against a export level of Rs 29.5 billion achieved during FY2005, the imports were close to Rs 21.1 billion. Thus, a net export level of Rs 8.38 billion was achieved by the Indian plastic processing industry during FY2005. The key plastic products imported include plastic articles, films, sheets and plastic products for packaging purpose.

India's International Competitiveness

In the international market, the key success factors for a plastic processing firm are the cost of production, brand image and the variety of products that it can produce. The favorable factor for the Indian plastic processing industry is the availability of the skilled and cheap manpower. However, the Indian plastic processing companies are significantly smaller in size compared to the world levels. This is on account of the fact that many products are reserved exclusively for the small-scale sector.

However, on account of the low labour costs, the potential for Indian exports is large. Its realization would depend on increasing presence of the organized sector. Thus, on account of low competitiveness of Indian plastic processing industry, Indian exports of plastic products are limited.

Critical success factors

The critical success factors for the firms operating in Indian plastic processing industry are provided as follows:

Product Mix

The plastic products are used in various applications/industries – which include household, agriculture, industrial packaging, fertilizer packaging, foodgrain packaging, FMCG packaging, pharmaceutical packaging and automotive industry. These industries have different financial flexibilities and dynamics, which influence not only the receivable position of the plastic processing companies but also the price, profit and margin of the products. Thus, the companies operating in manufacturing plastic products for the automobile sector are able to command higher price and margin than the other counterparts.

Strong brand image

Many of the plastic products are household products like furniture, buckets, lunch boxes, bottles etc. By building strong brand image, a company can increase the premium for its products and increase the sales level. The organized sector in the Indian plastic processing industry faces significant competition from the unorganized small scale sector which enjoys duty incentives and power cost savings. Thus, the firms in the organized sector which have a strong brand image are able to show a better financial performance than the rest. Supreme Industries Limited and Nilkamal Plastics Limited – which are amongst the large sized plastic processing companies enjoy good brand image.

Low polymer purchase costs

Plastic processing firms purchase polymer resins and convert them into useful products. The cost of polymer is nearly 60% of the realization of the plastic product. Although, the plastic processors being significantly smaller and independent of the petrochemical companies that manufacture polymers, they can minimize their polymer purchase costs by innovative measures. For example, with the polymer prices being cyclical, the companies can buy polymers, when the prices are low and postpone their purchases when they expect polymer prices to fall. For this strategy to be successful, the companies require large stocking capacities for storing polymer resins. Many companies in the Indian plastic processing sector follow this strategy.

High machine productivity

The major capital cost of plastic processing company is the moulding machine- whether extrusion moulding or blow moulding. The ability of the company to produce maximum number of products possible from the machine in a given time is a critical parameter affecting the returns from the company's investments. Further, not only the number of products need to be maximized, but also those products need to be maximized which offer higher realizations. However, producing variable products from a same machine involves setup time and changeover time which needs to be minimized so as to maximize the machining time which is the useful time for production of useful products. The machine productivity can be captured in the asset turnover ratio which would measure not only the productivity related to capacity utilization but also the realization obtained from such useful products.

Large capacity

The financial performance of an organized sector player improves significantly when its size grows. This is expected as more than 85% of the conversion cost (difference between the finished goods sales and the raw material costs) is of the fixed nature. However, as the size increases, the asset turnover falls resulting in a tradeoff between the two.

Low interest cost

The capital cost account for 12% of the total costs of a plastic processing firm. The companies which have high financial strength and those that can raise funds at a lower cost can have significant savings and higher profits.

DOMINANT POSITION OF RIL

RIL, along with IPCL (a former state-owned company subsequently acquired by RIL), has a share of over 60% of the Indian polymer market for all forms of polyethylene (PE): LDPE, LLDPE, HDPE, PP and PVC. While RIL has a large petrochemical complex, which is also the largest naphtha cracker in Asia, IPCL relies on three small to medium-sized petrochemical complexes based largely on natural gas (two medium-sized crackers using natural gas and one small-sized cracker using naphtha).

Polymers and its Types

Polymers:

Polymers account for around 70% of total petrochemicals, with growth rate of approximately 18%. Capacities growth at 27% CAGR. However, India accounts for only 2% of the global capacity.

Major types of Polymers:

1. LDPE [Low Density Poly-Ehtylene] / LLDPE [Linear LDPE]

The market segment for LDPE is growing at 12%. Nearly half of the total market demand for LDPE comes from the packaging industry, with major players like RIL, IPCL & Oswal. The end uses are Woven sacks for cement, food grains, sugar, BOPP films and containers for packaging textiles, processed food, FMCG, office stationary, components for automobiles and consumer durables, moulded furniture and luggage, fibres for socks.

2. HDPE [High Density Poly-Ehtylene]
 - Segment growing at 12%-15%
 - Domestic consumption value around Rs. 2200 Crores
 - Players – RIL, IPCL

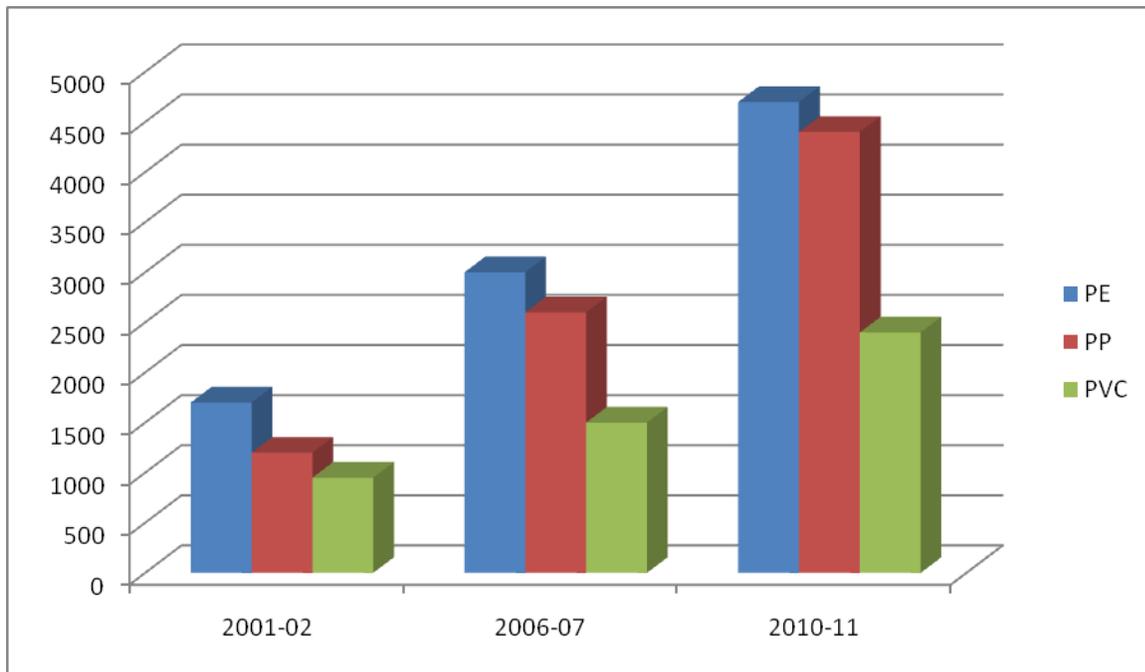
- End uses – Woven sacks, bags for fruits, containers for packaging, edible oil, processed food, detergents, chemicals, pesticides, industrial crates and containers, carrier bags, house-ware, ropes and twines, pipes for water supply, irrigation, process industry and telecom.

3. PVC [Poly-Vinyl Chloride]:

- Growth rate – 15%
- Domestic demand at 5,54,000 tpa
- Pipes accounts for 54% of PVC consumption and cable sheathing accounts for 14%
- End uses – Pipes and door fittings, insulation of wires, rigid bottles for packaging, footwears, flooring, blood bags.

4. PP [Poly-Propylene]-

- Light weight
- Domestic demand – 6,00,000 tonnes [approx.]
- End uses – Packaging material for sacks of cements, sugar, films and container for packaging textiles, FMCG, sports wear.



POLYMER DEMAND IN INDIA (in metric tones.)

Market Segmentation

A marketer can rarely satisfy everyone in a market. Not everyone likes the same soft drink, automobile, college, and movie. Therefore, marketers start with *market segmentation*. They identify and profile distinct groups of buyers who might prefer or require varying products and marketing mixes. Market segments can be identified by examining demographic, psychographic, and behavioral differences among buyers. The firm then decides which segments present the greatest opportunity - those whose needs the firm can meet in a superior fashion.

Processing plastics: techniques

There are various processing methods used to convert resins into finished products. The major processing techniques to process thermoplastics include:

Extrusion:

This continuous process is used for the production of semi-finished goods such as films, sheets, profiles, tubs and pipes. They are termed "semi-finished" because they must be further processed before they become useful articles. Plastic material is first loaded into a hopper and then fed into a long heated chamber through which it is moved by the action of a continuously revolving screw. At the end of the heated chamber, the molten plastic is forced out through a small opening called a die that is cast in the shape of the finished product. As the plastic extrusion comes from the die, it is fed onto a conveyor belt where it is cooled by blowers or by immersion in water. The operation's principle is the same as that of a meat mincer but with added heaters in the wall of the extruder. Examples of products include lawn edging, pipe, film and window trim.

Injection molding:

Since this process can produce mouldings of high quality and with great accuracy, it is very widespread. It is predominantly used for thermoplastics but smaller amounts of thermosets and elastomers are also processed this way. In injection moulding, the plastic material is also put into a hopper, which feeds into a heating chamber. A plunger pushes the plastic through the heating chamber where the material is then softened into a fluid state. At the end of this chamber, the resin is forced into a closed mould. Once the plastic cools to a solid state, the mould opens and the finished product is ejected. This process is used to make such items as rubber tubs, yogurt containers, closures, fittings and razors.

Blow molding:

Blow molding is a process used in conjunction with extrusion. The forms a molted tube of thermoplastic material. Using compressed air, the tube is then blown to conform to the interior of a chilled mould which clamps around the tube. Overall, the goal is to produce a uniform melt, form it into a tube with the desired cross-section and blow it into the exact shape of the product. This process is intended for use in manufacturing hollow plastic products and its principal advantage is its ability to produce hollow shapes without having to join two or more separately moulded parts. This method is used to make items such as commercial drums and bottles.

Rotomoulding

This process comprises of the following:

- a) Loading the resin in the mould
- b) Heating fusion of the resin
- c) Cooling and unloading the mould
- d) Unlike other processes, no pressure is involved and the plastic material is heated/melted and cooled in the mould.

POLYMER DISTRIBUTION

The polymer market consists of three major players, RIL, HPCL and GAIL. They all are using the same supply chain management. Polymer market consists of both small industries as well as large industries using polymers. To meet the requirements of customers, companies operate supply chain and depots. Large customers directly deal with companies through DCAs or Consignment Stockists and small customers those who require polymers in small quantity can take from dealers or company depots. There are traders in the market who buy from DCAs and sell in the open market. Small industries prefer to buy from traders as they get more discount and they have more choice of

products. DCAs are working on company's policy and contact the company on behalf of customers. On the sale of product through DCAs, company give commission to them. There are quantity and cash discount benefits available in the company. In case of dealers, they have to invest their own money in buying the product. All the risk and responsibility is of the dealer but in case of DCAs, they are acting only as a mediator between company and customer. The DCAs get their commission for the sale and all the risk is that if the company. The main work of the DCA is to contact company on behalf of the customer.

If a new customer is there, then the customer will contact the DCA and then the concerned DCA will submit all the details of the customer – industry, capacity, machinery, financial condition etc to the company, then the company will check the details and create customer account. The customers place their orders to the DCA and in turn the DCA place indent in the company through SAP, company will forward the order in plant and from plant, the stock will directly reach to the customer at the respective place. The transport will be company's own because of security reasons. Customer will pay through check or e-banking. The check will be paid either to DCA or directly to the company. The company operates both the accounts of DCA and customer.

In case of HPCL and RIL there is a credit facility of 14 days for customers. In case of GAIL there is channel financing in which company makes provision for loan from any bank to DCA and payment will be paid by DCA which it will get after customer makes the payment. On every sale, DCA will get commission. The whole responsibility will be of company. If the customers receives destroyed stock, may be due to accident or rain etc then he will complain to the DCA or Stockists which in turn will send a survey team to check the stock. The surveyor will give the report to DCA and that report will be submitted to the company. The company will get all the money from insurance company which inturn will be given to customer through DCA or Stockists.

All the polymer plants in India are tax exempted so there is no tax on the stocks travelling. That is why customers prefer to buy material direct from company not from depots as depots are taxable. Companies have introduced various slabs for Quantity discount and a fixed cash discount of Rs 400 or 600 is given in all the companies.

DCAs are working on behalf of customers, fulfilling their demands, getting commission and increasing the sales and revenues of the company.

RESEARCH DESIGN

A research design is a specification of methods and procedures for acquiring the information needed. It is an overall operation pattern and the framework of the project that stipulates what information is to be collected, from which source and by what procedure.

For the projected study our research design will be Exploratory cum Descriptive cum Diagnostic. It is exploratory as the efforts have been made to know the significance and effectiveness of Market Segmentation as a Development Tool at Indian Oil, for a product such as Polymers, which is just about to be launched and as such no major research work has been done in this regard. It is descriptive in a sense that the study would attempt to provide a descriptive analysis of the concept and its implication in the field of management development and in specific its implementation and adoption by Indian Oil. It is diagnostic as the study would attempt to diagnose the effectiveness of Market Segmentation as a tool in the field training and development of the management.

SURVEY SAMPLE

Out of the total number of industries, the sample has been selected on random basis. In total 20 industries have been surveyed for the purpose. Out of 20, 8 are using LDPE and 12 are using HDPE and LLDPE. As PP is mainly used by the industry.

SOURCES AND METHODS FOR DATA COLLECTION

The findings and major conclusion of the present study have been computed mainly with the help of Primary information gathered through administering a questionnaire prepared for the purpose. Secondary data, i.e., information from the company, websites, journals and through the unpublished data available at the company, have been used particularly for understanding the concept of Market Segmentation and recent trends in the field.

The administered questionnaire prepared deals with industrial information like name of organization, which products they are producing, which type of polymer they are using and of which grade, number of machinery used and capacity of production in a day and the payment mode.

ANALYSIS

The year 2008-09 was another performance driven year for THE CORPORATION. The year 2008 being observed as the year of customer service excellence to further strengthen the customer - employee bonds. Xtra Premium petrol and Xtra mile diesel bettered their quality and performance during the year. Availability of Xtra Premium petrol was extended to 2452 retail outlets of THE CORPORATION's marketing network spread in the country through 30000 sales point. It has taken extra initiatives in the petroleum marketing.

The polymer market is divided into two different aspects.

- 50% polymer market is of the packaging industry.
- 50% of the consumer durable goods.

Polymer used in the packaging industries like
Packaging of the food items

- BOPPS
- Used in wire and cables
- Used in wheat grain packaging i.e. woven sacks etc.

Polymer used in the consumer durable goods like

- Manufacturing of toys
- Used in the manufacturing of chairs
- Manufacturing of the buckets and mugs
- Used in the manufacturing of pipes etc.

Packaging

Plastic packaging (including flexible film and rigid containers) conveys the image of high quality, freshness and convenience. It is more cost effective than any other packaging material and is the largest single market for plastic resin consumption (packaging uses more than 40% of all plastics produced). Unstable resin prices (increase being as high as 70% in some cases) have not slowed growth or stopped consumers from demanding the benefits of plastic packaging which include clarity, toughness and seal strength. Currently plastic dominates the food packaging market and 50% of all food packaging is made from plastics. Consumers continue to favour the quality, convenience, and shelf life benefits of plastics in food packaging. Technological improvements are likely to assure that this trend continues.

Construction

About two-thirds of all materials consumed by the construction industry are thermoplastics and the rest thermosets. Engineering resins are being explored for applications requiring high ratings for mechanical, electrical, thermal and chemical properties. In addition, these materials may contain fillers and reinforcements to improve these properties. Low and high-density polyethylenes have also experienced a sizable growth in the last five years. HDPE is used for pipes, tanks, drums and containers and LDPE in films, liners and extruded products.

Household goods

Nearly 25% of the demand of injection moulding applications is from household. But discovery of newer applications by processors is vital for the growth of this market.

Appliances

Two major families dominate resin usage in the world appliance industry. In refrigeration, styrenics tend to be the biggest because of their application in refrigerator liners and internal components. In washers and dishwashers, PPs lead the way in tonnage, with the average washer containing 8 to 10 lb of PP and dishwashers over 15 lb. For use in

electrical enclosure applications, PVC tends to be the material of choice because it provides superior properties at relatively low cost. Plastics usage in cooking products is relatively low and typically confined to heat-resistant materials used in control knobs and some decorative trim. Usage in dryers also tends to be limited to engineering resins for use in mechanical parts.

Electronics

The criteria followed by major original equipment manufacturers in selecting materials for use in electrical/electronic products help determine which plastics are successful in this key market area. International Business Corp., for example, has long-established policies that support safety and health in its workplace and products, and foster environmental protection and energy and natural resource conservation. The company is committed to designing products that meet these goals while providing performance and long term reliability at a reasonable cost. Besides physical, mechanical, and thermal properties, the other key parameters are flammability, light stability, recyclability, resin processability, interchangeability with other resins, worldwide availability, cost, and environmental attributes.

Agriculture

Plastics are used in various applications in agriculture. The various uses of plastics include drip irrigation; as plastic film mulches; in green house technologies; high and low tunnels; livestock operations; ornamental nurseries; roof top cultivations; fruit, vegetable and ornamental crop productions; gardening; specific crop applications; in horticulture; biological engineering; by food processors; and packaging. Plastics use in agriculture provides following benefits:

- a) Improves the economic efficiency
- b) User friendly maintenance
- c) Efficient water and energy management
- d) Reduced temperatures and moisture fluctuations
- e) Control on insects and disease infestation
- f) Precise irrigation and nutrient applications
- g) Reduced wastage
- h) Reduction in soil erosion
- i) Insulation
- j) Savings and fertilizers

Despite these benefits plastics use in agriculture has been substantially lower in India vis-à-vis its use in agricultural in developed countries.

Polypropylene [PP] is mainly used in the industries. PP is highly used polymer in the industry. It is used for making woven sacks, carry bags, linear shopping bags and in industrial packaging. Other polymers being used are HDPE, LLDPE etc. Various process involved in the polymer industry are Thermo-Forming, Extrusion Moulding , Injection Moulding, Rotational Moulding and Blow Moulding etc. Polymers packaging is done in standard sized bags of 25 kgs. RIL is the major market player and has both the DCA's and stockists in the market and their main focus is only on the big market players. Supply of the polymers is not much appropriate and it keeps on fluctuating. Prices of the polymers are not stable and they keep on fluctuating with the international market and also due to an almost monopoly like situation in the domestic market.

There are various kind of polymer grades existing in the market, like Haldia (HPEP G – lene, G – lex {W50, A009, F55, HM0003, 160A080 etc}), GAIL (009, 040 etc). Industry gets the maximum amount of polymers from the DCAs. Payment is either by cash or at 14 days credit, but most of the time it's on cash basis. Polymer end users are either industry or domestic consumers.

LIMITATIONS OF THE STUDY

The surveyor of this report had to work under several constraints and limitations.

Some of them are:

- Time was one of the main constraints that led to make the sample size quite small.
- Market is so scattered that it is difficult to capture.

- Random sampling was used as the mode of conducting the study, but the ratio as compared to the whole population was very minute.
- The sample size taken was small, therefore it can be said that the chosen sample is not the representative of the whole population and this hindered quantitative research.
- Respondents may have been biased to certain questions. Some respondents were however not willing to share their views and did not give any relevant information.
- Respondents were reluctant to answer some questions as they took them as personal therefore increasing the possibility of error.

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CONTINENTAL GATEWAY AND TRADE CORRIDOR QUEBEC-ONTARIO: BETTER MULTIMODALITY

Ahibib Maryem

ABSTRACT

The two provinces Ontario and Quebec are the economic backbone of Canada. The transportation network in this area knows some economic and social problems due to the accumulation of international trade. In this study, we analyze the issues about the transportation network in Ontario-Quebec and we conduct a Benefit-Cost Analysis (BCA).

INTRODUCTION

The project of the Continental Gateway and Trade Corridor Quebec-Ontario (CGTCQO) is an agreement between the governments of Quebec, Ontario and Canada as well as 46 institutions working in the maritime, air and land in order to develop in this commercial area a multimodal transportation network, secure, efficient and sustainable (Ontario-Quebec Continental Gateway, (2009)). The project was created to solve many problems plaguing the network, especially congestion problems, mainly existing in areas centers (Montreal and Toronto), in the borders (especially Detroit-Windsor) and the busiest roads. Through several years, this situation increased wear of the infrastructure and declined security level, especially at the borders and security, especially on roads; the environmental impacts are also considerable in terms of emissions GAS, and quality of life of the population.

To resolve this problematic, we identify some several solutions by applying a Benefit-Cost Analysis (BCA) on the transportation network of the OQCGTC, subsequently, we propose a National Planning (NP) methodology to expose how to determine an optimal solution for balancing the transportation networks of OQCGTC.

In BCA, we do not propose to construct a section of road due to costs associated to this solution, and especially for our interest in solutions that can be achieved in the short term and that can have a rapid return on investment, thus, solutions will be adopted quickly and the transportation system can be improved rapidly.

as a result of BCA, we have proposed a combination of options that seems the most likely to cover all issues affecting the OQCGTC: apply a tax on GHG emitted by trucks and private cars - with a lower rate for the latter -; install Advanced Fleet Management Systems (AFMS) in all transport fleets (trucks, trains, boats) and in the consolidation and transfer terminal's facilities, with ensuring the integration of all these AFMS together; install a Scan -Truck (a Commercial vehicles operating - CVO) border, starting at the Detroit-Windsor border, the border is the busiest among the five boundaries of the network.

Subsequently, we expose what is a NP and we learn from the use of this methodology in Sweden because of its resemblance to the OQCGTC in some areas (weather, geographic position, existence of concentrated traffic flows in the same area, etc.); then we end by proposing a methodology to implement NP in OQCGTC while detailing the stages of its implementation and at the same time addressing the factors affecting the infrastructure, integrated technology and / or technology to integrate, the economic, political, regulatory and Social aspects.

1. Cost-Benefit Analysis of the CGTCQO

a. The problematic exposition

In CGTCQO commercial area, we find the greatest flow of trade in the country - 70% at least, which participates in more than 60% of GDP in Canada (Transport Canada (2008)); also, 80% of the Canada-US road and rail trade pass through the borders of CGTCQO (IBI Group, (2008)); in addition, over 60% of Canada's population occupies this area.

On the other hand, the area of CGTCQO is strategically positioned relatively to the international maritime flows because of the existence of the Marine Highway – on Saint-Lawrence river - which link the entire commercial area from the Atlantic to the five lacks of Ontario and Michigan, knowing that shipping is by far the largest type of

international freight transport in terms of quantity and it consolidates more and more deliveries in order to stop the least possible.

Therefore, in the area of CGTCQO, there are large international flows of goods circulating in a restricted area; with time, road transportation (of goods and people) has been developed to answer the demand. Due to the continuous growth of the international trade and its speed, some congestion problems were created, especially in central areas: the total annual cost of congestion for the nine major cities of Canada in regard to lost time and fuel consumption is between 2.3 and 3.7 billion USD (Transport Canada; (2008)) and it is expected that congestion continues to grow in the future (Transport Canada (2008)).

the biggest problems plaguing the OQCGTC are the imbalance of multimodality due to the dominance of the truck transportation; the wear of the infrastructure especially in the most used sections of the surface transportation network, hub-and-spokes areas and the terminals facilities; safety and security at borders (65% of Canada- United States trade pass through the boundaries of OQCGTC); increased wait times especially in borders and in the consolidation and transfer terminals; the high emissions of greenhouse gases (GHG) emissions and their impact on quality of life in the commercial area.

To decorticate this problematic, we separated the economical and social problems:

- Economical problems:
 - o *Multimodality disequilibrium*: truck dominate the merchandise transport
 - o *Wear of infrastructure*: especially on the strategic nodes, due to the high level of truck circulation on the roads – as well as the other transportation vehicles -;
 - o *Lack of fluidity, security and boarders safety*;
 - o *Expansion of Lead times*: especially at the area centers (Montreal and GTA), the boarders and, mostly, the consolidation and transfer terminals;
- Social problems:
 - o *Lack of road safety*: due to the truck-car cohabitation - 71% of fatal accidents in Canada involving a car and / or a truck in 2004 (Statistics Canada 2008);
 - o *High level of GHG emissions*: 74% of the transportation GHG emissions are due to road transportation (Plan d'action 2008-2012); the effects of this emissions appears in terms of air pollution, respiratory disease among the population, damage to the landscape and global warming acceleration.

The problems plaguing the area of CGTCQO have a major negative impact on the companies supply chains efficiency on several levels (cost of transportation, of inventory, of treatment, etc.), and increases their Total SCM Cost as well. On the other hand, social problems fall directly on the quality of life of the population (high accident rate, air quality, etc.).

b. Aims of the BCA

The specific objectives that we derived from the problematic described above and following this overall objective are as follow:

1. The reduction of congestion in the most affected nodes
2. Enhance distribution of demand between all modes of transport
3. Reduce GHG emissions
4. Enhance security on the transport network
5. Enhance safety on the transport network

c. Baseline scenario

Like baseline scenario, we propose to redirect the trucks circulation from the road sections that are suffering from congestion problem to other road sections that will be affected only to trucks, with being focus, during the detection of the other road sections, on the optimization of the ride.

d. Determining options

The following table summarizes the 4 options that we consider most relevant to the actual situation that the transport network in the area of CGTCQO is facing:

Table 1: options determined for the CGTCQO area during the BCA

Option	Description	BCA aims
1-Tax policy on trucks and personal vehicles	Set up a law that dictates to the trucking companies to pay a rebate related to the number of Kg of GAS issued;	1; 2; 3; 4; 5.
	Apply at the same time the same law on personal vehicle, but with a lower rate;	
2-Accelerating the transfer of freight between boats/trains/trucks at the consolidation and transfer terminals	Implement an integrated Advanced Fleet Management System – AFMS in terminals, boats, trains et trucks;	1; 2; 3; 4; 5.
	Update the transfer facilities train/truck	
	Standardize loading units	
3-Install an STI at borders targeting non-stop trucks	Install an STI that scans moving trucks (Truck-Scan)	1; 4; 3; 5
4- Establish a Short Sea Shipping (SSS) in the CGTCQO area	Establish a fleet adaptable to SSS	1; 2; 3; 4; 5
	Arrange facilities of central and regional to SSS	
	Allow reliable access to the fleet during the winter.	
	Equip the fleet with an AFMS	
	Easing regulations on SSS	

The options are autonomous and the reference period of time to apply the options is at maximum 17 years¹.

e. Organizing options

Option 1: Tax policy on trucks and personal vehicles: the system of taxation of GHG issued by road transport is proposed by the European Commission to be implemented by 2012 (Commission of the European Communities (2007)) and is already implemented in London, Australia and Germany (Blauwens, and al. (2006)). Also, emissions of GHGs from private cars in Canada are more important than those from trucks (Baldwin JR, Gu W. (2008)), that is why we propose to include the individual costs of GHG emissions related to personal cars; this strategy - the taxation of private transport of people - is part of short-term plans of the European Union (European Commission (2001)).

Option 2: Accelerating the transfer of freight between boats/trains/trucks at the consolidation and transfer terminals: Among others, we propose to normalize the loading units (containers, pallets and trailers); this has already been proposed by the European Union. We also propose to install an AFMS, which is a control system that provides, among others, better automation of fleets and real-time coordination of vehicle loads (Architecture Development Team, (2007)).

¹ Transport Canada should respect this duration (Gaudreault Valérie., Lemire Patrick, (2006)).

Option 3: Install an ITS at borders targeting non-stop trucks: it's a Commercial Vehicle Operations (CVO). Briefly, two devices (for screening and for satellite transmission) will be installed at the motorway crossing of the truck at the border; also, trucks must be equipped with a communication device compatible with those present in the border (The ITS/CVO community (2008)). This ITS is already in use in Australia (Reid, Myers (1996)) and the United States, only stations check the weight. We propose to start by the Detroit-Windsor border because it's the busiest among the five boundaries of the CGTCQO network.

Option 4: Establish a Short Sea Shipping (SSS) in the CGTCQO area: The SSS is already well established in Europe (Working Group "Accessibility" (2006)), in western Canada (British Columbia) and begins to emerge in the PCCCQO (Quebec Maritime Day (2009)).

Options 1 and 2 are combined in option A, to be known as "distribution of demand between boat / truck / train": the combination of these two options is encouraged in the literature, because with a fee between 10% and 20% on GHG emissions in road transport and, simultaneously, a decrease of half a day in lead times for rail, multimodality between the two modes is significantly promoted (Blauwens, and al. (2006)). Moreover, among the variables that determine the integration of seaport container terminals in supply chains are using the latest information and communication systems in the industry, the reliability of multimodal operations, adoption of services to the needs of consumers and identification of the least expensive option for transporting goods to hinterland destinations (Panayides, PM and DW Song (2008)); elements of this option meets these criteria by normalizing the loading units and by installing an AFMS in the consolidation terminals that helps in the distribution of demand between rail / truck.

Option 3 will be named option B

Option 4 will be named option C

f. Costs of options

Option A: distribution of demand between boat / truck / train:

- Cost of establishment of a tax on GHG emissions:* in terms of meeting and discussions, visibility of the Act, monitoring of its implementation, staff training for measurement and inspection of gas emissions emitted by trucks, companions of awareness and accountability of the individual. (Costs supported by the governments of Canada, Quebec and Ontario).
- Cost of standardization of loading units:* in terms of planning and implementation of the standards, modernizing obsolete or non-compliant items (Costs supported by the three governments and the owners of the lading units)
- Cost of modernizing facilities of consolidation and transfer terminals:* cost of updating and acquiring facilities dealing with the movement of goods between the three modes (Costs are assumed by the three governments and by shipping lines, road and rail companies)
- Costs of installing an AFMS in the terminals and the fleets of the three modes of transportation* (costs are supported by the three governments and the transportation companies concerned)

Option B: Install an STI at borders targeting non-stop trucks:

- Costs of governmental implication in international negotiations:* in terms of negotiating, with the United States the possibility of installing the Truck-Scan in the five CGTCQO borders, starting by Detroit-Windsor (Costs supported by the three governments, Canada, Ontario and Quebec and by the USA government if the collaboration implicates a financial of southern neighbour)
- Cost of installation of screening devices and satellite transmission border* (Costs assumed by the governments of Canada, Ontario and Quebec and neighbouring states where the device is installed)
- Cost of installing the device in screening trucks* (Costs supported by the governments of Canada, Ontario and Quebec and by the trucking companies)

Option C: Establish a Short Sea Shipping (SSS) in the CGTCQO area:

- Costs of government involvement:* in terms of financial support to major investments in the SSS, negotiation of reducing regulations that impede the development of maritime transport, adaptation of terminal facilities at central and regional SSS, addition of significant ice-breakers on the marine highway (Costs assumed by the three governments)

-Costs related to the maritime fleet: the costs of adapting existing vessels and acquisition of new ones which are fast and reliable (Costs are supported by the shipping companies and the three governments)

-Cost of establishment of the AFMS in the fleet (Costs supported by the governments of Canada, Ontario and Quebec).

While calculating the costs of options, the discount rate should consider the variation of the Canadian dollar due to the 2007 recession.

g. Benefits of options

In the table 2, we present the benefits of each option proposed above:

Table 2: benefits of the options proposed for the BCA:

<i>option</i>	<i>Security & safety</i>	<i>Transportation efficiency & productivity gains</i>	<i>Environmental impact</i>
A	Fewer road accidents Under-faulty goods	Multimodality enhancement (Train/ truck) Decrease wear of the infrastructure Increased flow rail Decrease in lead times at terminals Increased use of transit	Significant reduction of GHG emissions
B	Less risk of terrorism Over-delivery reliability	Reduced lead times at borders	relative reduction of GHG emissions
C	More safety (AFMS)	Multimodality enhancement (SSS/train/truck) Increased activities of regional ports	Significant reduction of GHG emissions

h. Analyse and presentation of results

The baseline scenario requires change the paths of all journeys, what have a direct effect on Just-In-Time (timeliness of delivery); at short term, it's difficult to ensure a secure way to separate trucks and cars with forecasting all the impact of change of road transportation paths. Option B, while involving less investments comparatively to options A and C, it's has less advantages. Option C depends on the relaxation of the cabotage acts (for example, marine fee for international vessels) and the presence of consensus between industry and providers of SSS, while the vast majority of industries are not yet receptive to adopting this type of transport.

We choose option A - distribution of demand between boat / truck / train, because it's the option that respond the most effectively to the objectives of the study its actions are solving the maximum of the most urgent and important problems, while offering advantages early and involving limited investment.

2. Structure of National Planning (NP) methodology

During this step of the study, we try to describe how the transportation system of the CGTCQO could be well managed by installing a National Planning (NP) system that handle the transportation system by calculating continuously the optimum solutions to all the problems of the area; the options that we proposed during the BCA above have to be considered during the calculations.

NP develops a comprehensive, rigorous and thorough vision for the transportation problem of a region, a country or a group of countries; it is an analytical tool that address, at the same time, the factors affecting the infrastructure, technologies and the economical, political, regulatory and social aspects. Any NP follows 4 steps: demand modeling, supply modeling, mode choice and assignment. Several countries have set up a NP system for managing their transportation systems, for example Belgium, Norway, Italy, Brazil, Sweden, etc.(Crainic, Gendreau, Kuncy  (2006)).

Generally, the PN can be transferred from one study area to another with some reservations. For CGTCQO area, the region that most resembles to this area is Sweden. Indeed, both regions have a goods transportation system

concentrated in the southern region, have focused international trade in these two areas have intensive trade corridors through which the greatest flow of goods in transit as well as two regions a similar climate. It is possible to learn from the Swedish model to implement a methodology for PN in the area of CGTCQO which will be discussed in the following:

Demand modeling: this step begins with the collection of input-output tables and simplification (generation) of data. Follows after the distribution of demand, where we determine the volume of goods passing through each sub-area for each product group (origins-destination. In the area of CGTCQO, we propose to divide the whole area by administrative geographical regions (17 in Quebec and 16 in Ontario) and the provinces of New England in the States United, the eastern provinces of Canada, the other States of the United States and the provinces of Mexico will be distributed by the states and provinces. Thereafter, the distribution of demand will be based on input-output tables available for different ministries (transport, industry, etc.). In Sweden, the model used at this level is the entropy. The latter is considered as a snapshot of data, however, this is the case for other most popular models (gravity and spatial equilibrium); so we propose to rely on the same model, entropy.

Supply modeling: this step provides matrix gathering information on different modes of transportation (all infrastructure and services relates to goods transportation from one point of origin to a destination point) that exist in the study area but without associating the flows with the product groups indentified earlier in the application. In the area of CGTCQO, we propose to gather all information about infrastructure of all transportation modes, carriers, shippers, intermodal transfer facilities, logistics services providers. To do so, we suggest first to apply to the associations of stakeholders mentioned above. This data set will develop an integrated matrix on the flows of goods.

Mode choice: this step involves gathering data (provided by the demand modeling, the supply demand, found in industrial and strategic studies - such as Cost Benefit Analysis (CBA) - etc.) to create a matrix that provided all information about the behaviour of the commodity in the network (the set of nodes, links, modes and transfers that represent every possible physical movement of goods over the available infrastructure in the area). The network of supply and all key measures to use during the assignment step must be clearly identified at this step (congested road sections, its intensity, its frequency, lead times in terminals, etc.). Also, the BCA is often devoting a high optimism when calculating costs and benefits. We therefore propose to integrate data of the BCA applied on CGTCQO area in this step to ensure the validity of the options and the choice of option A (distribution of demand between boat / truck / train). For the model to apply Sweden has used the "assignment on multimodal networks" which is a recognized modal for its capacity to expose the overall behaviour of the transport system (Crainic, Gendreau, Kuncy t  (2006)), so we propose to use the same modal.

Assignment: Once the origin-destination matrices are created, they are affected to the network of supply by using a mechanism of trip choice. This step determines the routes for each product by mode of transport and by sub-area, focusing on the most optimal trips in terms of cost, travel time and all the economic, political, technological and social implications that we had consider in the study. At this step, Sweden has used an optimization model system that can explain the overall behaviour of the transport system in the area which is in study and simultaneously be flexible enough to provide different results depending on multiple scenarios to consider; this system is an optimization model nonlinear that considerate at the same calculation multiple modes of transportation and multiple products. We propose to use at the CGTCQO the optimization model system used by Sweden at this stage.

Feed-back: at this step, the government deliver the information about the optimal trips to the shippers, carriers and all the institutions that will be implicated in these trips choices; also, the operators evaluate continuously the reliability of these trips and of the new devices included in the transportation system. For the CGTCQO, after implementing the NP system and the recommended actions in option A, it will be possible to verify the reliability of the Truck-Scan and AFMS installations.

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CORPORATE EXCELLENCE AS AN OUTCOME OF CORPORATE GOVERNANCE

Kalpana Agrawal*

ABSTRACT

The present century has marked, the outlook for business appears to be a blend of high prospects for growth, on the one hand, and serious concerns about the impact of business on society and the environment, on the other. Today, it is extremely important to have interest of a company aligned with those of the stakeholders. Corporate governance, which speaks of the transparency and accountability in the system, is a tool for corporate excellence. Corporate governance is a conscious, deliberate and sustained effort on the part of corporate entity to strike a judicious balance between its own interest and the interest of various constituents on the environment in which it is operating, good governance implies that the organization is run for the optimal benefit of the stakeholders. The stakeholders may be internal like promoters, members, workmen, executives and similarly there may be external shareholders like customers, lenders, dealers, vendors, bankers, community, government and regulators. The recognition of issues relating to corporate governance is timely as we come across no: instances of well-regarded corporates looting their shareholders for personal gains of managers or the owners. Therefore, corporate governance has acquired utmost importance in the present context. The managers at senior levels experience pressures leading to two broad options, doing the right thing or doing the wrong thing. Doing the right thing is what their training, knowledge, skill, judgment and conscience would tell them and thus, the role of a Human Resource Professional comes into play. The present paper is an attempt to study corporate excellence as an outcome of good corporate governance practices in present time of scams and also to derive the role of HRM in accomplishment of good corporate governance.

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INTRODUCTION

With the paradigm shift in the last decade in the corporate world signifying changes in material concept, technological advancements, leadership and innovations, corporate excellence has received considerable attention. Today's rapidly changing business climate challenges companies to continuously improve performance. Only companies with a commitment to corporate excellence will remain competitive. Quantitative improvements in productivity, quality, and customer and employee satisfaction are the crying need of the hour. Increasing competition across the globe compels the business organizations to change with the time and improve their business practices to remain competitive. A company in the present world has to justify its existence. It has to fulfill the aspirations of various stakeholders. To fulfill this objective, a company has to devise ways and means. It has to improve its performance in all the spheres, i.e. planning, organizing and controlling. Corporate governance is the buzzword, it has been used to fulfill the above mentioned objectives.

Corporate Governance can be defined as systematic approach to structuring and running a corporation in the best possible manner. It has succeeded in attracting a good deal of public interest because of its importance for the economic health of corporation and welfare of society. Corporate Governance is to conduct the business in accordance with owner or shareholder's desires, which generally will be to make as much money as possible while conforming to the basic rules of the society embodied in law and local customs." (Surender, 2002).

Governance implies a degree of control to be exercised by key stakeholder's representatives. Governance is about governing. It is not merely about ownership. Even an owner has to learn to govern. Good governance implies that institution is run for the optimal benefit of the stakeholders in it.

Basic traits for good corporate governance:

- Accountability of board of directors and their constituent, responsibilities to the ultimate owners-shareholders.

- A key element of good governance is a transparency and perceived as such. It is a shared way of corporate functioning and not a set of rules. Transparency in turn requires the right to information, timeliness and integrity of the information produced.
- System of checks and balances and greater simplicity in process of governance.
- Clarity of responsibility and enhanced accountability.
- Adherence to the rules. Corporate actions need to confirm to letter and spirit to codes.

The concept of corporate governance came into existence essentially to protect the investors against unscrupulous or unreasonable decisions by the management of the companies. There have been instances of companies, which had registered, incorporated, raised equity and then ceased to exist. No one knows where they have gone or at least no one is really investigating in any case where the promoters have gone. There are all listed companies, which asked for listing. There would perhaps be much more such cases if we go into the entities, which are not listed. For instance in 1993, the government decided to open up cooking gas marketing to the private sector. Promptly, dozens of companies came up all over and hardly any one of them was listed. But, they collected funds as deposits from intending customers and franchisees and vanished. All of us are aware of the so called scams in the stock markets, but beyond that, if we consider the loans passed by the banking system to private corporate sector, again more than US\$ 20 billion worth of loans are non-performing assets. How can we forget the public sector? If we take this sector in India, - the central public sector – the accumulated losses over the years exceeds the same magic number of US\$ 20 billion. This is more interesting issue because this is where the charge is that this money has vanished into thin air, not because of corruption per se, but essentially because of mismanagement. So in the country whose annual budget is Rs. 4000 billion, Rs. 3000 billion have just gone out of the system.

Scams like Harshad Mehta, Ketan Parekh, UTI, RIL, ENRON, TYCO, etc. have created a crises of investors's confidence. Therefore, there is mistrust among investors and stakeholders about corporate management and that is why for the practicing managers to achieve corporate excellence, good corporate governance becomes an issue of life and death.

Corporate Excellence

Corporate Excellence mean would depend on one's vision. Excellence has been defined in many different ways. Some commonly accepted measures of excellence in the modern economic model of the firm include:

- Profitability
- Satisfied stakeholders, such as customers, employees and shareholders
- Revenue and profit growth.
- Growth in market share.
- Growth in market value (stock market capitalization)

Peter and Waterman,(2005) gave a new view of excellence in organization. They highlighted seven 'S' approach that is structure, Strategy, System, Style Skills, Staff and super-ordinate goals. According to them when seven variables are aligned, there is an organized excellent company. Further Companies which operate with super-ordinate goals and strong culture, they found that people at all levels know, what they are supposed to do in most situations as guiding values are clear. Seven factors will be driving force in excellence of organization.

Corporate Excellence and Corporate Governance

Corporate Governance is not restricted to the organization or the profession. Its ambit envelops society. Corporate Governance is holding the balance between economic and social goals and between individual and communal goals. The governance framework is there to encourage the efficient use of resources and equally to require accountability for the staurdship of human resources. The aim is to align as nearly as possible the individuals, corporations and society (Asthana ,2000).

The fundamental concern of corporate governance is to ensure that the firm's directors and managers act ethically in the interest of the firm and its shareholders and that the managers are held accountable to capital providers for the use of assets. Corporate governance issues are in general receiving greater attention as a result of the increasing recognition that a firm's corporate governance affects both its economic performance and its ability to access long term, low investment capital. Values are coming into demand once again. Success achieved through any means, fair or foul is being frowned upon in the business world. Scams in the US and the other parts of the western world are changing the business culture. Today society is demanding that business be cleaned up to lead to excellence. To quote J.R.D. Tata "Every company has a special continuing responsibility towards the people of the area in which it is located and in which its employees and their families live." And many Indian corporates like Tata companies, ITC, some Birla companies, Gujarat Ambuja and so on have taken up the challenge. In a competitive environment the expectations all around are of fair play and effort to excel by ethical means. Indeed ethical conduct promotes corporate success. It motivates the employees. Good corporate governance and ethical conduct is good policy for achieving success. Numerous companies have now laid elaborate systems, structures and processes as part of corporate governance. Companies are highlighting their practices of corporate governance in their annual reports, to achieve Corporate excellence.(Bhatia,2005).

For Corporate governance to lead to corporate excellence it must be structured according to the principle of the Vedas aligned with natural law. In Indian context Corporate governance can be drawn from the following age old Mulyas (values):

- Public good which means greatest possible good for all
- Dhanam, creation of wealth through competence (Kaushalam) and productivity (Utpadakta);
- Swatantrata, autonomy and independence, in business decisions
- Vishwastata, trusteeship, implying that management is a trustee of stakeholder,
- Dharmyudh, fair battle, providing a level playing field to all and ensuring fair competition.
- Vividhta , variety or innovation ensuring flexibility in approach.

Corporate governance means being true to own belief and it constantly teaches the value of understanding the stakeholders. It builds enduring bonds with shareholders, employees, investors, depositors, borrowers, suppliers, customers and business constituents. It may be stressed that Corporate governance is not merely about enacting legislation but establishing a climate of trust and confidence. It is about commitment to values and ethical business conduct and a high degree of transparency.

Infosys, Wipro, HCL, Amul, Ranbaxy, BPL Ltd. and many others are shining examples of how companies that adopted better corporate governance standards were rewarded with higher valuations by investors. This in turn multiplied the wealth of principal shareholders and thus the concept of business excellence discovered the value of corporate governance.

The focus on improving Corporate Governance and enhancing business excellence is relatively new in India. Until a few years ago, management appeared least concerned of the way stakeholders benefited from the company's performance. During the infamous scam in National Stock Exchange of 1990, it became apparent that for remarkable corporate excellence, introduction of best Corporate Governance practices is must. Companies that adopt voluntarily certain high standards of Corporate Governance are likely to excel. Carrier Aircon at one time attracted higher valuation than Voltas, Pfizer was far ahead of Ranbaxy and Cipla. Birla , 3M continued to find investors though it was reporting losses.

Fast paced corporate developments like the rise of employee stock options have also changed management paradigm. And the rises of knowledge based industries are prime creators that have changed old valuations method. Today the level of Corporate Governance is taken in to account for judging the corporate excellence. The winds of change forced managements to look at Corporate Governance ,as a function aimed at upholding corporate values and beliefs.(Jayashree,2000).

REVIEW OF LITERATURE

The study was intended to study corporate excellence as an outcome of good Corporate Governance and the role of HRM in accomplishing good corporate governance. The review of literature reveals the following:

Corporate governance is a more important concept of lasting value. It is an important concept and a means to an end i.e. of achieving corporate excellence. The corporate governance can be achieved only by proper tapping and nurturing good corporate governance practices.(Bhatia,2005) Companies identify, assess and establish core values, core capabilities and core purpose to achieve corporate excellence. It is imperative that all corporates be innovative, creative and responsible citizens to bring excellence in their vision, mission and action. Good corporate governance is a source of competitive advantage and a critical input for achieving excellence in all productive, economic and social pursuits. Corporate excellence and good governance are so intertwined that achieving one without the other or at the cost of other is simply unimaginable (Bhatia,2005).

Corporate governance brings about equilibrium between the expectations of owners, employees, customers and other stakeholders to achieve corporate excellence. A recent survey by Mckinsey and the World Bank has found that institutional investors are willing to pay 20% more on average with a good governance record. A company's most valuable asset is goodwill it enjoys with its stakeholders, which can only be earned by actions, not demanded. It is being increasingly recognized that being a responsible corporate citizen is important in ensuring long-term success of a company (Arya et.al,2003).

HR policies form the frame work for effective functions of HR management; they form the culture in business management, i.e., they are the very functioning of a business enterprise. The practices should necessarily result in benefits to all the stakeholders like the creditors, suppliers, shareholders and the employees etc .Such practices create an awareness of the need to achieve the business goals in the best possible and ethical manner. They also create a sense of respect for ethical values in the organization. If the HR practices adopted by an organization include periodic review of employee performances, adequate training for the workforce and most important of all, career advancement norms for its personnel, creating motivation and commitment in the workforce, then the organization will be able to reap the full business benefits and will emerge successful to the great satisfaction of all the stakeholders. While HR policies form the framework for effective functioning of HR management, HR practices form the culture in business management. The practices should ,therefore, necessarily be the "best practices in HR management, which would result in benefits to all stakeholders and thus organization will reap more and more excellence (Malikarjunan,2006).

To face the formidable challenges of the future, the corporate factor has to be empowered with a new vision, dynamic mission and new mandate to follow best practices of governance. Every corporate has become alive to the reality of having to stay lean and fit in order to deliver its best strictly in consonance with the principles of corporate governance. Any attempt on the part of corporates to circumvent this reality and resort to shortcuts to achieve excellence will only result in short-circuiting their ill-conceived efforts (Bhatia,2005).

Indian experiences:

Corporate excellence and Governance are closely connected concepts and it is felt that in the long run, it is difficult to achieve excellence without good governance. The house of Tata as instituted THE JRD QUALITY VALUE AWARD for corporate excellence incorporating highest standards of Corporate Governance for the group companies to compete and achieve. Tata Steel was the first company in the group to achieve this prestigious award as a milestone in their efforts towards greater excellence in 2000 after tremendous effort putting over several years. The economic times award for corporate excellence was achieved by Tata Steel in 2001. The House of Tata had progressive and nationalistic outlook right from the very beginning, Jamsetji Tata, the founder .The House of Tata has maintained its track record of good corporate governance. Companies like Infosys, HLL, AVB Group, Wipro, Bajaj AutoSatyam Infoway, Dr.Reddy,s lab., Maruti Udyog, ICICI, L&T, ONGC, HDFC, AMUL, & RANBAXY

are some of the companies well known for achieving corporate excellence through good Corporate Governance practices.

By the 1990s, Infosys Technologies Limited had emerged as one of the best-managed companies in India. Its corporate governance seemed to be better than those of many other companies in India. It received many awards due to these practices. “We have always striven hard for respectability, transparency and to create an ethical organization. There are certain expectations that we have not fulfilled. But we are also a very young organization and in areas like track record of management, we may be low because we are yet to show longevity.” (Murti, 2001).

In 2001 Infosys was rated India’s most respected company by Business world. Infosys was also ranked second in corporate governance among 495 emerging companies in a survey conducted by CLSA Emerging Markets. It was awarded the “National Award for excellence in Corporate Governance by the Government of India”. In 1999, Infosys had been selected as one of Asia’s leading companies in the Far Eastern Economic Review’s review 2000 survey and voted as India’s most admired company by The Economic Times.

HDFC, within its web of relationships with its borrowers, depositors, agents, shareholders and other stakeholders has always maintained its fundamental principles of corporate governance – that of integrity, transparency and fairness. For HDFC, corporate governance is a continuous journey, seeking to provide excellence, an enabling environment to harmonize the goals of maximizing shareholder value and maintaining a customer centric focus. HDFC maintains that efforts to institutionalize corporate governance practices cannot solely rest upon adherence to a regulatory framework. HDFC’s corporate governance compass has been its business practices, its values and personal beliefs, reflected in the actions of each of its employees (Irani, et.al, 2001).

Conclusion and Recommendations

The concept of corporate governance is entering a phase of global convergence. The driver behind this is the recognition that companies need to attract and protect all stakeholders, especially investors – both domestic and foreign. Global capital seeks its own equilibrium and naturally flows to where it is best protected and bypasses where protection is limited or non-existent. Companies stand to gain by adopting systems that bolster investor trust through transparency, accountability and fairness.

The tide of regulation has risen to a high watermark and while there is compelling evidence of benefits to companies, which adopt good governance practices. ‘Spreading the Word: Changing Rules in Asia’, the title of Corporate Governance Watch 2004, an annual collaborative study of the corporate governance landscape of Asian markets undertaken by CLSA Asia Pacific Markets and the Asian Corporate Governance Association has concluded that there appears to be a clear correlation between companies and markets with strong corporate governance and superior returns over the long term. According to the study, India ranks among the top three in terms of corporate governance. With increasingly integrated capital markets, good corporate governance is of paramount importance for companies seeking to distinguish themselves in the global economy and to achieve excellence.

Enterprises must become more flexible and adaptive, and this requires deep cultural changes and strong leadership, providing individuals with stimulating and interesting work and giving them the autonomy and flexibility to perform the jobs well, enhancing job satisfaction and flexibility which encourages greater performance and productivity. By developing the level of skill and competence in the workforce; management development programmes can inspire managers to use more people management practices to encourage commitments & job satisfaction and encourage communication, providing organizations with the skilled and committed people they need to achieve business objectives both in the present and future; developing better management systems to ensure that these people are managed in such a way as to optimize their contribution to business performance.

Human resource policies must provide empowerment to the executive management of the Company, and simultaneously create a mechanism of checks and balances which ensures that the decision making powers vested in

the executive management is not only not misused, but is used with care and responsibility to meet stakeholder aspirations and societal expectations. It is no wonder therefore that organizations that have sound & well defined human resource policies and practices for good corporate governance functions and empowered, the public perception is enhanced and is reflected in company's growth, profitability & satisfied stakeholders.

Corporate Governance has become must for organizational health and wealth. Corporate Governance plays the role of supporter and facilitator in the journey that enterprises undertake to reach the peaks of business eminence while, at the same time, adhering to the highest ethical standards.

Long before corporate governance became a buzzword in industry circles, today the corporate scenario is predominantly dictated by the tenets of Corporate Governance. One of the most important aspects of the modern corporation is that quality, ethics and excellence must be built in to the system at the level of the person, the process and the product. Thereby the core competency can be identified and leveraged for success and this is not possible unless the Corporate Governance function is in place. This needs managerial maturity and a high sense of values and for which HR head will have to come forward.

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CUSTOMER RELATIONSHIP MANAGEMENT – A CONCEPTUAL FRAMEWORK OF PERFORMANCE PARAMETERS

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ABSTRACT

Customer Relationship Management (CRM) has revolutionized the current scenario of business by delivering customer satisfaction and developing brand loyalty. This paper presents an overview of CRM, and discusses various domains where CRM is beneficial. Measuring performance of CRM package is a complex task as most of the parameters are qualitative. Hence business organizations are looking forward for frameworks that can provide them a quicker evaluation of the performance of CRM systems. The focus of the paper is to discuss the conceptual framework and highlight the quantitative aspects of CRM performance measures that can be easily measured and analyzed.

Keywords: CRM, CRM framework, Performance Parameters

INTRODUCTION

The companies are adopting CRM to increase customer satisfaction, retention and develop customer loyalty. CRM strengthens the overall value chain of the company as it provides an important feedback mechanism to improve business operations and modify the products and services according to the need of the customer. Besides contributing to the core operation in the value chain it also strengthens the forward value chain by formalizing methodologies to attract new and retain existing customers. It helps in improving the quality of service for each customer by managing and organizing every interaction of the customer at each level of contact. Information technology (IT) plays an important role in achieving the desired objectives, as it is a tool for implementing these methodologies and creating the required customer interaction.

The main objective of CRM is to generate revenues by earning goodwill of customers in the market, hence the focus of CRM is to gather the customers' information to automate the processes, and improve the efficiency of actions. CRM fulfills various objectives of an organization such as increasing the productivity in terms of sales, adding to the cross-selling and up-selling opportunities. It gathers information about the customer from all departments and communicates and shares this information. This facilitates and automates the administrative documentation for future reference. The database generated helps in better understanding of customer's need which can be utilized in improving customer service and follow up processes. All these activities result into retaining existing customers and discovering new ones. The overall impact of CRM is increased market share, overall profitability and better campaign management. Academicians and researchers have observed that customer orientations in business have become a key concept and they have realized that IT is an important tool to deliver it. Jarvenpaa and Ives [1991] studied executive involvement and participated in management and information technology whereas Mahmood et al. [2001] discussed the factors affecting information technology performances. Devaraj and Kohli [2003] also discussed performance impact of information technology. Performance measurement has become a key issue in business practices and researchers have started studying performance in the view of IT and CRM practices. Lebas [1995] gave an analysis of performance measurement. Measuring performance is a complex task as one has to identify various factors affecting it. V. Kelen [2002] discussed CRM measurement framework and gave some attributes for describing and evaluating CRM measurement. They also suggested several implementation approaches. Critical success feature of CRM technology initiatives were analyzed by Croteau and Li [2003], further Reinarts et al. [2004] also studied CRM process and discussed the impact of performance. Greve and Albers [2006] analyzed the relationship between CRM technologies its usage and CRM performance. In addition, they identified the drivers that affect implementation success for each phase the most. Kraeuter [2007] proposed an integrated approach in determining and measure the effectiveness and efficiency of CRM projects. Various frameworks for CRM were suggested. Kim and Kim [2007] gave a detailed discussion on balanced scorecard technique. The main objective of implementing these techniques is to get the business value of CRM system. Dong and Zhu [2008] gave

a resource-based perspective and their findings provided important implication for understanding how various resources in competitive environment shape CRM value.

Lot of studies and research has been done on CRM, information technology and the performance measurement. In the ever-changing scenario of business it is difficult to adapt and follow these frameworks to evaluate the performance of CRM initiatives. Since the business cycle has become short and decision making and evaluation has to follow its pace, we have suggested the evaluation of CRM initiatives through quantitative aspect so that the organization can quickly decipher the impact of implementing CRM, thus, providing a quicker decision making and justification for the cost. The paper has been divided into various sections. Section 1 presents the introduction wherein the objectives and scope of the CRM is discussed. Section 2 discusses the complexity in CRM evaluation and the performance measurement frameworks of CRM. In section 3 various performance parameters are given which are of great relevance in evaluating CRM systems. Section 4 presents a quantitative framework which can be used by the organizations to evaluate the performance of the CRM system. Section 5 provides conclusion and gives the future directions.

2. CRM Complexity and Performance Frameworks: Business organizations and firms are increasingly adopting and investing CRM practices. CRM has become a core information technology driven business strategy. However Rigby et al. [2002] presented the survey of international data corporation and Gartner group stating that the rate of successful CRM implementation is below 30%, which hardly justifies the cost of implementing the cost of CRM system. Researchers and academicians have tried to evaluate CRM in their own perspectives and the results at times seem to be misleading. Some researchers focus on qualitative (non measurable/intangible) factors whereas some base their CRM initiatives effectiveness evaluation on the quantitative (measurable/tangible). Hence decision-making and evaluation of CRM systems have become complex. Implementing CRM is a difficult task, which cannot be accomplished in a day or two. It is a time consuming process, which requires a lot of planning and efforts. Certain clear objectives are associated behind implementation of any new process, methodology or technology. The parameters, which directly help to meet out those objectives, become the measurable for that technology. In today's competitive scenario organizations require quicker decision-making as delay leads to susceptible risks of the environment. Even the change in the system need to be monitored in real time so that adjustment and corrective measures may be taken quickly so that the response time of the system can be reduced and thus the risk due to system failure can be minimized. Evaluating CRM effectiveness also helps in monitoring the current activities and planning and predicting future activities thereby taking necessary actions to improve the performance and analyze not only the cost but also the benefits of the CRM.

2.1 CRM measurement frameworks: Various CRM measurement frameworks are given to measure CRM performance after its implementation. These frameworks give guidelines to the organization and follow different approaches. Some of the important frameworks are:

- **Service Profit Chain**
- **Structured Conduct Outcome**
- **Balanced Scorecard**

2.1.1 Service Profit Chain: Service profit chain is a business model suggested by a group of researchers from Harvard University. It establishes a relationship between the following parameters:

- **Revenues, Profit and Growth:** This framework suggests that every organization strives towards maximizing profit, growth and revenues which are all linked to each other.
- **Customer Loyalty:** Higher revenues, profit and growth are directly linked to loyal customers as loyal customers are brand ambassadors of the products and they influence the decision of perspective buyers. Loyalty towards a product is achieved when the customers are satisfied. In fact the degree of satisfaction has to be very high to convert a satisfied customer into a loyal customer.
- **Customer Satisfaction:** Loyalty may be directly linked to customer satisfaction. Only satisfaction may not be sufficient, as only satisfied customers may not be loyal customers. It is only the super satisfied customers, who become loyal.
- **Quality of Service:** Quality of service influences customer satisfaction. Though there is no measure for quality of service and it is a perceived parameter, but customers link it to their expressed and unexpressed needs, which are satisfied.

- **Satisfied, Loyal and Productive Employees:** Quality of service is a direct result of satisfied, loyal and hence productive employees. Only a satisfied employee would be loyal and productive, in turn providing the best services to its customers.
- **Internal Services and Policies:** Internal services and policies, which give maximum benefits to their employees, prove to be a big stimulus to have satisfied employees. Again satisfied employees may be more enthusiastic and motivated to deliver best services. They are more loyal and hence more productive.

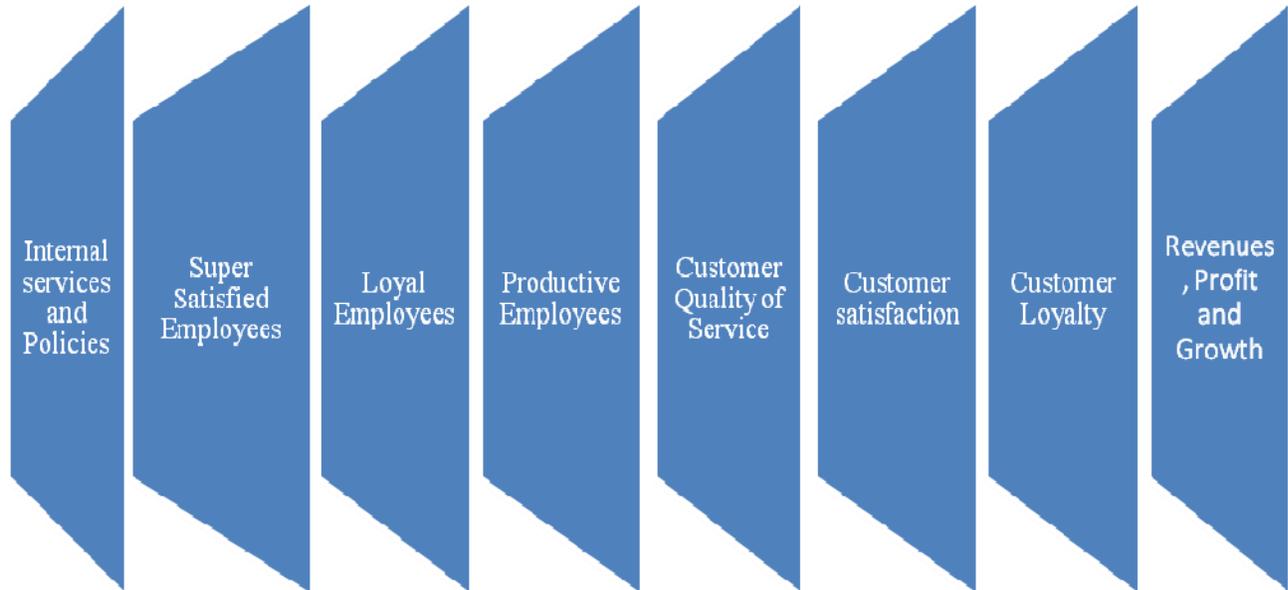


Fig. 1: Service Profit Chain

2.1.2 Structured Conduct Outcome: This framework indicates that market performance is determined by market conduct which in turn depends upon market structure. Market structure includes those characteristics within a market that influence the nature of competition and pricing in the market. It is dependent on buyer seller concentration, entry condition etc. Following may be some of the components that make up the structure, conduct and outcome model for the business organization:

- **Basic Condition:** Consumer demand, production, technology, rate of growth, product quality, elasticity of demand, seasonality and raw material
- **Structure:** Number of seller and buyers, barriers to entry of new firms, product differentiation and vertical integration diversification
- **Conduct:** Advertising, research and development, pricing behavior, plant investment, legal tactics, product choice, merger and contracts
- **Performance:** Price, production efficiency, allocative efficiency, equity, product quality, technical progress and profits.
- **Government Policy:** Regulation, antitrust, barriers to entry, taxes and subsidies, investment, incentives and employment incentives.

2.1.3 Balanced scoreboard: This is a generic framework defined by Kaplan and Norton, which can be customized as per the needs of any enterprise. It aligns organizational objectives according to following 4 different dimensions:

- Financial—To measure financial benefits
- Process—To measure internal efficiency
- Customer—To measure aspects related to customer
- Learning/Growth/Innovation—to measure the learning or innovations of any enterprise.

All the frameworks discussed contain performance parameters. These parameters may be classified as:

- Qualitative or Intangible assets measurements
- Quantitative or tangible assets measurements (Financial gains)

Intangible or qualitative measurements are very important to identify as they play an important role in establishing long-term relationship of the customers and in turn achieving long-term goals, and steady growth of an organization. The idea is to identify and quantify the qualitative assets. The examples may include customer satisfaction, customer retention, which companies try to measure and quantify. Quantification of qualitative parameter requires customer surveys pre and post CRM implementation and various scaling techniques may be used to access their responses. It is difficult at times to analyze the complete framework in view of these qualitative analysis as they are not only time consuming but also their evaluation is quite complex. Since the firms look towards a quick evaluation of the CRM systems it is better to concentrate on the performance parameters only, instead of adopting a complete framework.

3. Performance Parameters

According to Dr. James Harrington “Measurements are the Key. If you cannot measure it you cannot control it, if you cannot control it, you cannot manage it, if you cannot manage it, you cannot improve it”. Most of the organization put more emphasis on measurable important and not on important measurable.

CRM performance measurements may be strategic or operational. How an enterprise builds and deploys a CRM measurement framework is solely related to its planning and in turn objectives. Every enterprise implements CRM as per its own requirements. So the CRM measurement parameters may vary as per the business model used in an organization and the business unit within the organization. For example for those companies with support center, the manager may frequently check whether the Service Level Agreements are met out or not. He will also check the time taken to complete a request of normal priority and high priority whereas; organizations with marketing and production domain have different set of queries. We can categorize the performance parameters in three broad areas based on the business model:

- Performance parameters for brand building
- Performance parameters for customer equity building
- Performance parameters for customer interaction

This may further consist of:

1. Marketing operation
2. Sales operation
3. Field operation
4. Website operation

3.1 Performance Parameters for Brand Building: The goal of brand building is to make an impact of a brand on specific class of people. If the brand is new then this impact should be so deep, that it can replace existing brands in the same category. If the brand already exists, then it should maintain its presence in the market steadily over a long period of time. Brand building is a continuous process, which may include brand loyalty, brand awareness, perceived quality and brand association.

- **Brand Loyalty:** It shows a level of commitment from customer to repurchase or use a particular brand again and again. Repurchasing the same brand may not be a token of commitment but also because of situational constraints like non availability of other better options, or the customer might have invested some money in that particular brand to get added benefits etc. The customer should have a great inclination towards a brand, which is exhibited in his behavior when he repurchases the same brand. This kind of fascination towards using a brand may be very beneficial for any brand as the customer may be willing to pay extra or more cost to use the brand and can also bring some new customers.
- **Brand Awareness:** This refers to how many customers may recognize or recall a brand name or logo as an item in the available options of brands. It also ensures that the customer clearly knows what to expect from a particular brand and what not.
- **Brand Quality:** It is the perceived overall quality of the product with regard to its intended purpose.
- **Brand Association:** Brands are perceived and linked to some person, group of people, emotion, area of benefit etc. In other words we associate a brand to some physical or emotional attribute.

3.2 Performance Parameter for Customer Equity Building: Customer equity includes the customer goodwill and it extrapolates over the lifetime of the customer. Customer equity has three drives:

- **Value Equity:** Customer assesses the value of the product service provided by the company.
- **Brand Equity:** It is the value of brand assessed by the company.
- **Retention Equity:** The tendency of the customer to stick with the brand even when it is priced higher than a substitute product or product of different brand.

Evaluation of customer equity involves customer value analysis. It compares quality and price of product against competition. Qualitative research or survey is carried out to achieve this. Other qualitative approaches depending upon surveys to indicate the customer satisfaction are given which analyse the pre purchase and post purchase behavior of the customer.

3.3 Performance Parameter for Customer Interaction: This parameter can be utilized mainly for domains where customers have direct interaction with the systems or in other words we can say that service operation are directly linked with the customers.

3.3.1 Marketing Operation includes operations that let company plan, schedule, execute and track their marketing assignments/objectives. The performance parameters for marketing operations are:

- **Response Rate:** This can be measure by the formula $(R/P)*100$.
Where R is the population of people responded to the company and P is the total population.
- **Conversion Rate:** It is the percentage of people who purchased the commodity or completed the activity highlighted in the campaign.
- **Average Order Size:** Average amount spent by a customer per order.
- **Attrition Churn Rate:** Rate at which customer opt out or switch to another brand.

Market operation may involve various costs such as average interaction cost (Cost involved in interacting with the customer across multiple media) and customer acquisition cost, cost incurred by the company to acquire a new customer.

3.3.2 Sales Operations include sales force, automation of components of CRM. This includes tracking team lead as they develop sales performance measurements of individual staff, monitoring sales performance of product, cost of sales and reviewing the impact of training on performance. The parameters that can be analyzed are:

- **Sales expense,** call expenses related to sale
- **Sales Quota:** amount of sales handled by sales representative.
- **Number of calls** made by sales representatives.

3.3.3 Service Center Operations: Customers are increasingly adopting interactive services for their enquiries, grievances, e-commerce activities, hence phone technology to handle incoming and outgoing calls are becoming most sought after activities of service centers.

Some important performance parameters, which reflect on CRM efficiency, related with service centers are:

- **Call counts,** which represent the number of calls received or made, and also the call duration.
- **Average hold time** is another parameter, which analyses the service center performance. It is the amount of time a customer waits before the agent is serving him.
- **Abandonment rate:** It is the number of abandoned or dropped calls to the total number of calls. Lesser the abandonment rate better is the performance of the service center.
- **Average abandonment time:** It is the average time a caller waits before abandoning the call. This may be given by the formula AC/TC (Total number of abandoned calls/Total number of calls)
- **Call Completion time:** Time taken by the agent to complete the administrative task and complete the call.
- **Average cost per call:** This can be obtained by dividing all the costs (C_i)

) incurred in the center by the total number of calls (N). This can be calculated as $\frac{\sum_{i=0}^j C_i}{N}$ where $C_i = i^{\text{th}}$ Cost incurred; $i=0, 1, 2, \dots, j$; There are j costs in the centers and $N =$ total number of calls

- **Agent Initialization:** $\frac{T_a}{T}$ where T_a is the time spent by an agent on the call and T is the total time.
- **Blocked Calls:** These are the calls which are neither received not provided a waiting buffer as all the agent are busy and the buffer is also not available. Number of blocked calls increases in high traffic conditions hence the blocking probability of the customers is dependent on the arrival rate, service rate and the number of agents to serve the calls.

3.3.4 Field Service Operations: This includes the post sales activities such as warranties and service contract management, scheduling and dispatching field service agents, service call routing, problem tracking and resolution management. The performance parameters for field operations are:

- **Response time:** Amount of time it takes a service agent to respond
- **Completion time:** Amount of time it takes a service agent to resolve a customer's problem.
- **Repair fulfillment time:** The time taken to deliver a requested part or service needed for a repair.
- **Service call priority:** Service calls are frequently prioritized to comply with service contracts or warranty terms or we can say that it specifies the significance of the request

3.3.5 Web Site Operations: Web site performance monitoring is an important aspect while maintaining good relationships with the customers. In most of the cases website may be the first place where the customer will get all the information about a product. If the website is attractive and provides all the information in an effective and efficient manner, the customers may think of buying a product. Hence web site maintenance has become one of the most important aspects while measuring customer-facing operations.

The website should be designed in such a way that it attracts the visitors and also make them stay longer to use the website services. If the performance of the website is not good, it is unlikely that the same visitor may open it for next time. There are certain parameters on the basis of which we may evaluate the performance of any website. Some of them may be as follows:

- **Response Time:** This is the key indicator of the performance of the website. Visitors may lose their interest if the website is slow or unresponsive. According to Gartner, 50% of visitors will abandon if it takes more than 15 sec to land.
- **Display:** If some of the objects are not getting displayed correctly or their functionality is not as expected, visitors may not find the complete information and thus may not be interested in visiting the website.
- **Look and Feel:** This is one of the most important aspects as the users may be interested to visit a site only if its GUI is properly designed and proper attention has been paid to color combinations and overall display impact on the visitor.
- **Information:** Information provided on the website should be correct and authentic.
- **Navigation Scheme:** This includes the number of clicks to reach a particular page or link. This is also known as download time. The visitor would be more interested in the website if the number of clicks to reach a particular link is less.

Once these parameters have been taken into account, and the website has been designed considering all these points, the next step is to review certain other parameters on the basis of which we can measure the performance of the above mentioned parameters and thus the performance of the website. These may include the following:

- **Visitor Count:** This is the number of visitors who have visited a website.
- **Unique Visitor Count:** This counts the number of unique visitors. It will not double count the users who visited a site multiple times in a period. It might be difficult to count such users accurately as some users may not register with a website, or may use different machines to visit a website, also cookies might be disabled to get the information about them.
- **Page Hits:** The number of pages that have been downloaded or or the number of times a particular page has been visited.
- **Duration:** The total time a visitor has spent on a page.
- **Click Through rate:** This is the percentage of users who clicked on a particular advertisement or a banner adds.
- **Registered User Breakage:** This is the percentage of users who started interacting with the site, but later chose not to complete the information.
- **Click Stream:** It maintains a kind of log files in the web server. This may be further used to derive data such as page hits, visitor count etc.

After analyzing the data against the above-mentioned parameters we can make improvements in the website as and when required. A tool may also be useful, which measure the performance of the website against all above parameters. Some reports may be generated on daily, weekly or monthly bases to measure the performance. Availability of the website should be monitored on a 24*7 bases.

4. Quantitative CRM Performance framework

Frameworks suggested to evaluate the performance of CRM mostly use the qualitative parameters, which are difficult to measure by the companies, or the companies require the help of research firms to evaluate the effectiveness of CRM in terms of finding the customer equity, brand value etc. Parameters of customer interaction which include service operations, field operations and website operations can be easily calculated. The simplest way to measure the success of any strategy is first list out the expected behavior or so called goals. If, after implementing that strategy, we are able to achieve those goals, we can say that the strategy is successful. Hence, the goals become a measure for any strategy. Before suggesting the quantitative framework it is important to analyze the modules of CRM package which facilitate the customer relation management and also provides data for the quantitative analysis of various parameters

Software packages are developed to provide a complete CRM solution and help in improving the performance of the business processes. Broadly a CRM package constitute of the following modules.

- Customers and contact Management
- Sales reports
- Reports Analysis (Meeting, email, fax, calls, offers, invoices)
- Customer telephony Interface (CTI)
- Campaign Management
- Telemarketing
- Customer Self Service
- Support
- Multi Channels Communications
- Direct Marketing
- CRM for Communications
- Inventory Management
- Warehouse Management
- Cost Management
- Customer and Volume Pricing/Multiple currency
- Order Management CRM
- Customer Data Integration

The figure 2 describes the Quantitative framework to be adopted by the companies to evaluate the performance of the CRM initiative. An organization's CRM performance can be determined by evaluating the efficiency of marketing operations, sales operations, service centre operations, field operations and the website operations. Not all the companies have the same set of operations. Virtual organization may only have the website operations whereas the service oriented company will have marketing, sales, service centre, field and website operations. The number of operation types depends on the nature of product and the industries' service delivery mechanism.

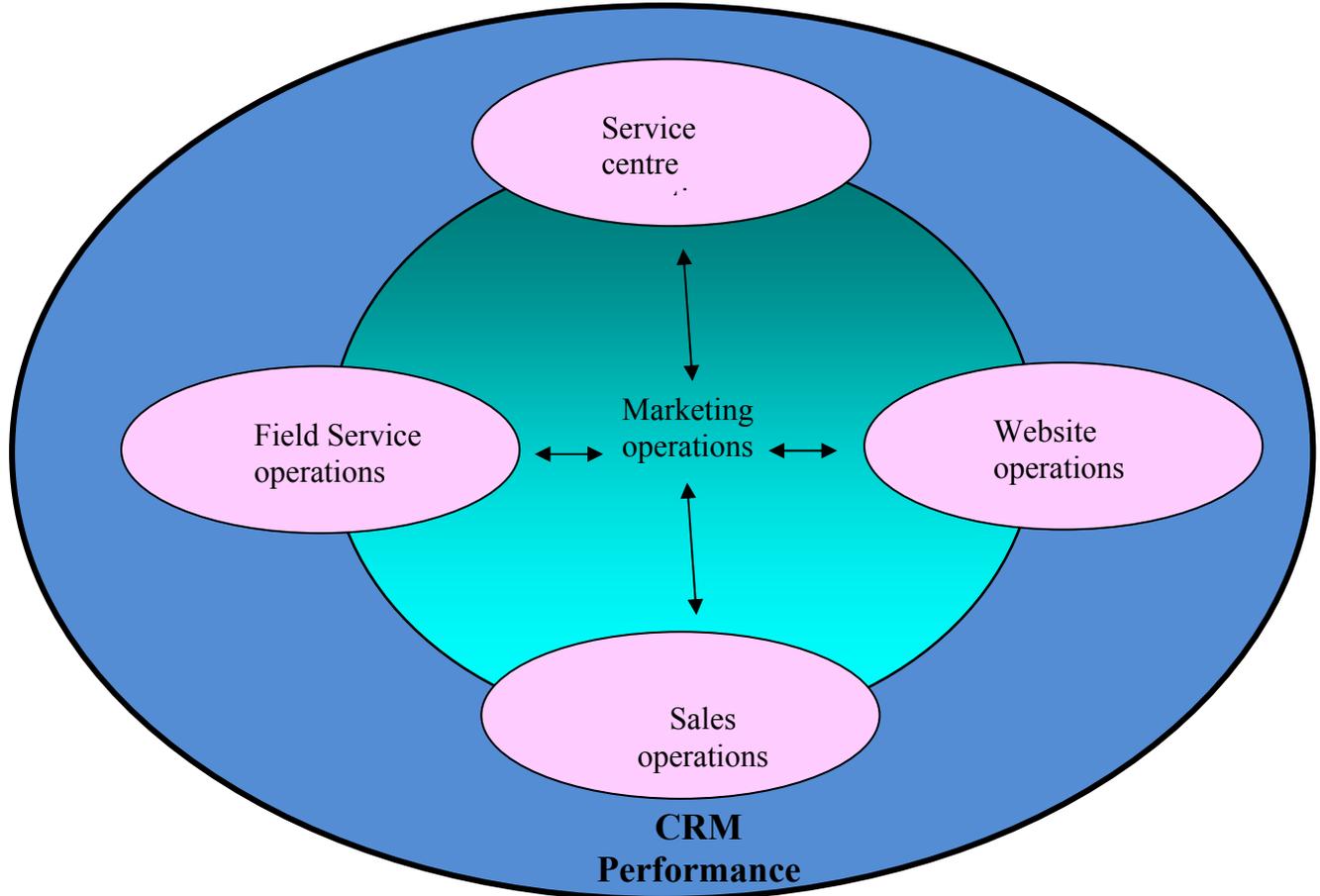


Fig. 2: Quantitative Framework for CRM

The details of each operation are discussed in section 3. Before implementing the system the quantitative performance parameters are evaluated in the system without CRM initiatives and then CRM can be simulated prior to and during its implementation. After implementation the data is captured and analyzed by the quantitative parameters discussed in section 3. Modules capture all the data required to compute the effectiveness of the system and then comparative analysis may be carried out to see the system effectiveness. These methodologies help in quicker and faster assessment of the system. If the CRM implementation is effective the assessment normally reveals results in terms of:

- Increased overall profitability
- Increase in the number of new customers
- Increased customer retention
- Increased number of order on a customer and time basis
- Increased cross sales
- Increased up sales
- Increased reactivation of previous customers
- Increased referrals of new customers
- Increased market share

- Increased ticket closure

5. CRM in Future Perspectives:

In today's highly competitive environment, the industries are growing at a rapid pace. It takes very less time to adapt to the new requirements needed by the customers. As the competition is intense so it becomes mandatory to measure the role of the CRM in current scenario as well as to predict future aspects related to long term goals or market conditions. Implementing CRM may be easier but to measure CRM is a time consuming process. Generally organizations use predictive models or approaches to determine how successful and effective a particular methodology will be, prior to launching that program or service. In this paper we have presented the quantitative tools, which can be used to simulate and predict the effectiveness of CRM solutions and also test the simulated results once it has been implemented. Though qualitative aspect cannot be neglected and the frame works like balance scorecards are required to truly analyze the performance of the CRM systems but they can be used in long term where we can take the advice of expert teams. Whereas the immediate decision making of the current system can be done on the basis of suggested parameters. CRM may also be helpful in providing comprehensive set of data representing the market behavior and conditions. By closely analyzing this data companies can determine how to change the current working style and adapt to the new one as per need of the customers. Analyzing the correlation between various parameters that directly influence the performance and help in suggesting the critical parameters, which should be worked upon to achieve the desired goal, can further extend our work.

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E-COMMERCE AND INFORMATION TECHNOLOGY: A REVOLUTION

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ABSTRACT

The development of electronic commerce (herein after referred to as EC) can be said to be the greatest event in the history of mankind, next only to the Industrial Revolution of the early 20th century. Electronic commerce, combined with mobile commerce, is likely to become a major business phenomenon across the globe in the near future. India is currently in the midst of an e-commerce and m-commerce revolution. The E-commerce and M-commerce are likely to be in nascent stage in India. The paper elaborates the evolution of Ecommerce, its behaviour & impact on Indian consumers. It addresses what the future holds for dispute resolution methodologies when law meets the technology. The paper discusses the nature of the technology, overview of the recent developments & pros and cons involved in the use of technology.

INTRODUCTION

Until the last few centuries, there were two main Revolutions – the Industrial Revolution and the Electronic Revolution. The Industrial revolution transformed our society from agricultural based to industrial based and the electronic revolution transferred our society from mechanical to electronic based. This 21st Century is the beginning of new revolution, i.e. network revolution. It interconnects the different parts of the world together and the concept of globalisation comes into existence. The internet is the engine of this revolution and e-commerce is the fuel. The idea of conducting business transaction via electronic media is an integral part of many businesses for several decades. But due to the advancement of internet technologies and advanced cryptographic techniques, e-commerce comes into the existence.

EVOLUTION OF COMMERCE

Commerce has evolved over the centuries. Prior to the evolution of money, it was a simple barter process; the evolution of money brought with it the concept of “market place”. In market place, commerce is function of 4p’s – Product, Price, Place and Promotion. It was realised that with the slightest modification of 2Ps i.e. Price and Place, can bring the convenience to the customer of getting product at their home. With this concept of street vendor was born, afterwards the concept of mail-order cataloguing and tele-shopping came into existence with development of media vehicle. The latest generation of commerce is one that can be done over internet. Internet provides a virtual platform to buyers and sellers to sell and buy the goods and services. The commerce over internet is known as “Electronic commerce” or “E commerce”. E commerce has emerged as boundary less trade medium in the era of globalisation.

WHAT IS E COMMERCE? E commerce is the buying and selling of goods and services by electronic means particularly over internet or any other application that relies on the internet. The 3 main components of e-commerce are as follows:

- (a) Economic Activity is involved
- (b) Interaction occurs electronically.
- (c) No Organisational boundaries.

E- Commerce comprises the transaction for which internet acts as a medium for making payment as for consuming the service/product by the end consumers. There could be the 3 conditions for consuming and making payments for the products.

1. Paying online and consuming online, like online games.

2. Consuming online and paying offline, like jobs, matrimonial etc.
3. Paying online and consuming offline, like travels, books etc.

E- COMMERCE REVOLUTION: E commerce is affecting all aspects of the business and playing the major role in economy of the country. No company can afford to ignore e-commerce. India is in the midst of the e-commerce and m-commerce revolution. India has potentially earned revenues worth \$100 billion by 2008 from e-commerce. The revenues earned from internet and e-commerce related software and service exports were as follows²:

From the business perspectives, it offers unlimited shelf space; it is not bound by operational timings and geographical boundaries.

Year	Sales (Million \$)
2000-01	12,000
2001-02	1,800
2002-03	2,300
2003-04	3,000

**TABLE – 2
KOREA’S TOTAL E-COMMERCE TRANSACTION FOR YEAR 2006-2007 ³**

Transaction Category	2006 (US \$ thousand)		2007 (US \$ thousand)		COMPARISION 2006 vs. 2007 (US \$ thousand)	
E-commerce Total	413,584	100%	516,514	100%	102,930	24.9%
B2B	366,191	88.3%	464,456	89.9%	98,264	26.8%
B2C	9,132	2.2%	10,226	2.0%	1,094	2%
C2C	3,826	0.9%	5,032	1.0%	1,206	31.5%

TYPES OF E – COMMERCE: According to buyer and seller relationship, e-commerce applications are divided into following categories:

(i) Business to consumer (B2C): Under this the seller is Business Organisation and the buyer is the consumer. B2C is further divided into following verticals:

² Dr. Bhasin, Madan Lal, “E-Commerce and M-Commerce Revolution-Perspectives, Problems and Prospects”, Muscat, Sultanate of Oman, December, 2005, P.827.

³ “Korea e-commerce market trends”, U.S department commerce, 2007

- (a) Travel: Tour operations, Hotels and Railways.
 (b) E-tailing: Online retailing and online auction.
 (c) Classifieds: Online jobs and Matrimony.
 (d) Digital downloads: From internet to mobiles

B2C E-Commerce industry for year 2006-07 was Rs 7080 crores and for 2007-08 was Rs 9210 Crore. India's share in B2C revenue Generation⁵

**TABLE – 3
INDIA'S SHARE IN B2C REVENUE GENERATION**

Products	2006-07(Crore)	2007-08 (Crore)
Total B2 C E-commerce	7080	9210
Online Travel	5500	7000
E-Tailing	850	1105
Online-classifieds	540	820
Digital Down Load	170	255

**TABLE -4 THE WORLD WIDE
ACTUAL AND ESTIMATED
SALES FOR B2C CATEGORY⁴**

YEAR	B2B Sales(including EDI) Actual & Estimated US\$ Billion
2007	240
2006	190
2005	150
2004	130
2003	100
2002	80
2001	70
2000	50
1999	25
1998	10

(ii) **Business to Business (B2B):** In this case both the buyer and seller are the business organisations. There are three types of system which are as follows:

- (a) Buyer Oriented
 (b) Seller Oriented
 (c) Virtual Marketplace

The share of B2B in total global e-commerce was 79.2% during 2000 and rose to 87% during 2004. According to the regions B2B e-commerce in \$ billions during 2000-04 are as under⁶

**TABLE – 5
REGIONAL SHARE OF B2B E-COMMERCE**

Year \ Region	2000	2001	2002	2003	2004	As % of world wide B2B commerce 2004
North America	159.2	316.8	563.9	964.3	1600.8	57.7
Asia/ Pacific	36.2	68.6	121.2	199.3	300.6	10.8
Europe	26.2	52.4	132.7	334.1	797.3	28.7
Latin America	2.9	7.9	17.4	33.6	58.4	2.1
Africa/ Middle East	1.7	3.2	5.9	10.6	17.7	0.6
Total	226.2	448.9	841.1	1541.9	2774.8	100

(iii) **Consumer to Consumer (C2C):** This refers to the situation where both seller and buyer are consumers, like online auction. Ebay.com provides the world's largest online trading service by means of online auction. Examples: baazee.com, bidorbuy.com

Prospects: A small segment right now, these portals will face logistical hurdles and people's resistance to online shopping in the initial years.

⁴ Nitya L Kamakar, "E-Business for creating wealth-Hype or reality", School of management, University of western Sydney, Australia.

⁵ "consumer e-commerce market in India 2006/07" report by e technology group for internet and mobile association of India (IMRB)

⁶ Ruth Andam Zorayda "E-commerce and E-business", e-ASEAN Task Force, UNDP- APDIP, May 2003

(iv) Consumer to Business (C2B): This is the new form of commerce in which a customer specifies the requirements to a business, which provides a product that meets these requirements. In this there is a strong element of customization. Examples: razorfinish.com. A more popular example is priceline.com of the US.

Prospects: World over the smallest section of the Net business; it is just about emerging in India

ADVANTAGES OF E-COMMERCE: e-commerce is advantageous for both consumer and business organisation.

1. With e-commerce consumer can search the global market anytime and anywhere.
Consumer can easily compare the products in the global market.
2. Consumer can not only evaluate the best possible product efficiently, but they can execute the order conveniently and receive the goods instantly.

For business organisation the prime objective is to manage the formula Profit = Revenue – cost. E-commerce is attractive because it can be used to raise profits by increasing revenue while decreasing cost. Revenues can be achieved by explaining new opportunities and expanding into global market. In terms of cost reduction, e-commerce can reduce manpower and operating expenses.

TRIGGERS AND BARRIERS OF INDIAN E-COMMERCE MARKET: There are various triggers which motivate the online shoppers to buy product online. The top 6 reasons given by shoppers to buy online are:

- (a) Save time and effort.
- (b) Convenience of Shopping at home
- (c) Wide range of product are available
- (d) Lower Prices and discounts.
- (e) Detailed information of Product.
- (f) One can compare various models, brands and prices.

Saving time is the major factor that drives consumer to purchase online. Online stores do not have store constraints, thus companies can display whole range of product they offer. This enables the consumer to choose after comparing the various factors of the products on display. There are certain concerns while buying online are:

- (a) Not sure of product quality
- (b) Amount not negotiable
- (c) Security issues
- (d) Desire to touch and feel the product
- (e) Have to wait for delivery.

The road block in the ecommerce is absence of touch & feel and lack of interactivity so as to allow for negotiations. The security of online payment is the major concern. In spite of various benefits provided by e-commerce, the above stated concerns have become critical user base.

CATEGORIZATION OF INTERNET USERS: Based on the behaviour towards buying online internet users can be classified into 4 categories.

Users Category	Characteristics
Conventional	People who shops from physical stores.
Looks for information (LFI's)	People who browse for information but don't shop.
Apprehensive	People who will not shop on the net unless their concerns are addressed
Enthusiasts	People who are willing to try out.

The majority of internet users look for information on various product categories online, a relatively smaller portion of them actually buy online. The sequence in which the above category of internet users can be targeted by online players is mentioned under:

Enthusiast → Apprehensive → LFIS → Conventional

M- COMMERCE: One of the areas of e-commerce that is rapidly growing across globe is mobile commerce. m-commerce was born due to new technological advantages such as GSM network, WAP Protocol, 3G Technologies. The m-commerce has shifted the traditional “4P” business model to “5C” model i.e. (consumer, content, community, commerce and CRM). There are various factors which attributed to the growth of m-commerce, like the development of newer and smaller technologies; more mobile population worldwide, wireless media is often cheaper than the wired media.

HINDRANCE IN M-COMMERCE GROWTH: There are various factors which affect the growth of m-commerce like the physical constraint of mobile devices, the difficulty of mobile application to bring easy to use inexpensive and secure technology and the consumer resistance to change their payment habits. The basic problem is the lack of widely agreed upon the technology standard for conducting m-commerce internationally. The second leading issue is the interface for users on handheld devices. The web browsing interface requires minimum screen size to be effective and efficient. Keyboard function on a cellular phone one often awkward. There are many practical constraints in wireless technology. The third issue with the m-commerce networks world wide is limited bandwidth available from wireless media.

LAWS FOR E-COMMERCE IN INDIA: New communication system and digital technology have made changes in way of transaction business. Now a day’s computer is used to create, transmit and store information. People are selling and buying the products and services online, but it is difficult form due to 2 legal reasons.

- (1) Requirement as to writing
- (2) Signature for legal recognition

The general assembly of United Nations adopted the Model Law on Electronic Commerce by a resolution dated 30th Jan 1997. Afterwards the Information Technology Act has been passed to promote the efficient delivery of Government services by means of reliable electronic records. This Act is known as Information Technology Act 2000 (ITAA 2000). The purposes of the Act is –

- To provide legal recognition for transmission carried out by means of electronic data interchange and other means of electronic communications, referred as “E- Commerce”, which involves the use of alternative paper based method of communication and storage of information.
- To facilitate electronic filling of document with govt. agencies. This Act came in effect on 17.10.2000.

The ITAA 2000 Act **does not apply to the documents** which are required to be stamped like:

- Power of Attorney as defined in Sec I of the Power of Attorney Act.
- A trust defined in Sec. III of Indian Trust Act
- Any contract for the sale as conveyance of immovable property.
- Any such documents or transactions which may be modified by the central govt. in official gazette.

The Information Technology Act, 2000 facilitates e-commerce and e-governance in the country. The new law makes e-commerce, online transactions and digital signature legally binding. The new law allows India to join “digital dozen”, a club of 12 nations that have a legal frame work for e-commerce. According to ITAA 2000:

1. Electronic contracts will be legally valid.
2. The digital signature is legally valid.
3. There should be Security procedures for electronic records and digital signature.
4. There should be an Appointment of certifying automobiles and controller of certifying authorities.
5. Certifying authorities to get license to issue digital signature certifications.
6. Various types of computer crimes and penalties provided under the Act.
7. Establishments of cyber Appellate tribunal under the Act.
8. Act to apply for offences or contraventions committed outside India.
9. This act states Power of police and other officers.

DIGITAL SIGNATURE: Digital signature is “Signed” cipher text that can be sent over the internet. It is also called as e-signature. It is close parallel to handwritten signature. Like handwritten signature, the digital signature is unique; only one person presumably possesses the private key. Any subscriber can authenticate on electronic record by affixing digital signature. “Subscriber” means a person in whose name the digital signature certificate is issued. Now e-commerce is legal in India, violators can be taken up in the court of law and all form of electronic communications can be used as evidence. The acts also establish the regulatory framework and lays down the punishment regime for different cyber crimes and offences.

WHAT DOES IT ACT ENABLE?

1. Legal recognition of E-Transaction/Record.
2. Retention of document in electronic form.
3. Where the Law requires the signature, the digital signature solves the purpose.
4. Facilitate e-commerce and Electronic Data interchange (EDI).
5. E-Governance
6. Acceptance of contracts expressed by electronic means.
7. Facilitate E-Filing of data.
8. Uniformity of rules. Regulation and standards regarding the authentications and integrity of e-record.
9. Publication of official gazette in electronic form.
10. Prevent computer of e-records fraud forgery alteration of e-records fraud forgery or falsification in e-commerce and electronic transactions.

AMENDMENTS OF INFORMATION TECHNOLOGY ACT 2000: The bill passed in the parliament of the amendments to ITA 2000 is referred to as ITA 2000 Amendment Bill 2008 or ITAA 2008. The ITAA 2008 adds 8 affiances, 5 of which are added to the ITA 2000 and 3 to IPC.

Section 66: This Section combines contraventions indicated in Sec. 43 with panel effect and reduce the punishment from 3 to 2 years.

Section 66 A: this section covers sending of offensive messages.

Section 66 B: Whoever dishonestly receives or retains any stolen computer resources shall be punished with 3 years imprisonment or fine of 1 Lac or both.

Section 66C: According to this section whosoever fraudulently or dishonestly make use of any electronic signature, password or any other unique identification feature of any other person, shall be punished with 3 years imprisonment and fine up to Rs. 1 Lac.

Section 66D: whoever by means of any communication devices or computers resources cheats by personation, shall be punished with 3 years and shall also be liable to fine up to Rs. 1Lac.

Section 66E: if anyone intentionally or knowingly captures, publishes or transmit the images of private are of any person without his or her consent, shall be punished with imprisonment extended to 3 years the fine not exceeding 2 Lac or both.

Section 66F: whoever with the intent to thereafter the unity, integrity, security of India as to strike terror in the people. Knowingly or intentionally penetrates or access a computer resources without authorization or exceeding authorised access commit the offence of cyber online and shall be punishable with imprisonment which may extend up to imprisonment of life.

Section 66A: This covers “sexual explicit context”.

Section 67B: this is a new section added in ITAA 2008. it states whoever publishes or transmit the material in electronic form which depicts children engaged in sexually explicit act likewise creating text, images, downloads, advertises exchanges or distribute material in any electronic form depicting children in obscene, facilitates abusing children online shall be punished with imprisonment that to 5 years and fine that can be extend up to Rs. 10 Lac on first conviction⁷.

⁷ Information Technology Act 2000 Amendments Details Unveiled, December 25, 2008, available at act2008.htm

IMPACT OF ITAA 2008 ON IT COMPANIES: By ITAA 2008 on IT companies are happy because ITAA 2008 has tried to address the demand for “Data Protection”. the earlier version of ITA 2000 ne provide that data vandalism would be treated as an offence under section 66 of the Act with the imprisonment of 3 years and compensation of up to Rs 1 crore but there was no specific indication of the measure to protect data in the hands of BPOs. Though the govt. introduced a separate bill called “personal data protection Act 2006”, this bill is still pending in the parliament. Now ITA 2008 has tried to address the demand of IT industry by specifically introducing two section namely 43A and Section 72A.

Section 43A: If any corporate, possessing, dealing or handling any sensitive personal data or information should control and maintain the reasonable security practices and procedures. Thereby any wrong use of data shall be liable to pay damage by way of compensation. In sec. 43 of ITA 2000 the upper limit for compensation was Rs 1 crore but in ITA the upper limit has been removed.

Section 72A: under this section, disclosure “without consent” or “in breach of lawful contract” exposés a person including an “intermediary” to three year imprisonment, the offence is cognizable but bailable.

FUTURE OF E-COMMERCE: e-commerce is the future of shopping,’ the future is here. It’s just not widely distributed yet”-William Gibson. The internet economy will continue to grow robustly; internet user would buy more products and buy more frequently online; both the new and established companies will reap profit online.

E-commerce will remain important for countries and firms that already possess the environment and the capabilities to utilize the Internet for sales purposes. e-commerce will also become a low cost and important economic development tool for firms located in developing and industrial countries, allowing for both the purchase and sale of firms' products to both businesses and final consumers. However, as all countries, particularly third world countries, will continue to have competitive problems, the development of a local infrastructure dedicated to electronically extending the reach of its citizens and firms, as well as the development of modern technology infrastructure to support the use of the Internet, is necessary. One of the challenges that developed countries has, such as the US and the United Kingdom is that their infrastructure is old and is being updated. A number of the third world countries should only install new equipment and, given the funds, thus leap frog ahead in Internet use. If a country believes that E-commerce will be important for its firms to enhance their viability then technology will need to be enhanced to accommodate the ever-increasing demands on bandwidth to support Internet usage. Laws, particularly related to security (and the OECD) will have to be passed to accommodate E-commerce. Taxes, whether actual, or under the guise of telephone charges will need to be reviewed and revised to accommodate Internet sales. Industrial and final consumers will have to be accommodated in terms of their views of the less personal buying paradigms. Vendors will have to learn to manage sales electronically. Both social classes and entire cultures will become less insular and learn how to accommodate a widened view of the world.

KEY HIGHLIGHTS

- By 2012 it is expected that more than 1 trillion will be spent online by B2C consumers. B2B spending will exceed this considerably.
 - E-payment solutions are an important part of e-commerce transactions; however security issues continue to tarnish the industry.
 - Asia Pacific leads the world in terms of using mobile phones for m-payments, accounting for around 85% of customers worldwide.
 - BuddeComm estimates revenue from mobile content and services (excluding SMS), accounts for around 7-10% of total mobile revenues worldwide. SMS remains popular and accounts for a further 10% of total mobile data revenues.
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- Online advertising growth is set to continue for the next few years, but will slow slightly in the wake of the US financial crisis. It is expected that online advertising will eventually account for around 20% of all advertising spend in some markets.
- Search services are central to almost everything that users do online, and this places leading search companies such as Google and Yahoo at an advantage. In the emerging Chinese market, Baidu and Alibaba also have a good foothold.
- Google is still the most popular website property worldwide; however individual countries and regions show unique differences with many local sites remaining popular. Other web properties proving popular across multiple markets include Yahoo, Microsoft and Wikipedia sites, Apple Inc, eBay and Amazon.

CONCLUSION:

Region	2000	2004
Asia	5%	10%
Western Europe	46%	83%
Rest of the world	7%	7%

Year	Revenue (in Crore)
2007-08	5500
2005-06	1180
2004-05	570
2002-03	130

The future of E-commerce is going to depend upon a positive confluence of technology, regulation, laws. Culture, social issues, economics, vendors, competitors and all consumers. From the estimated future sales figures, that appears to be happening. Overall, e-commerce is and will be important for countries and firms that already possess the environment and the capabilities and capacity to utilize the Internet for sales purposes. While e-commerce may offer little initially to bring them to the industrial nation status, there will be dramatic increases in the well being of many third world countries. Economics, politics and competitive forces will also help bring them into the 21st Century of electronics, driven by the Internet that has no boundaries and is owned by no nation. A restructuring of worldwide channels of distribution will occur with concomitant new sales, sometimes to the detriment of existing industrialized nations, with a major contribution to the economic development of both industrialized and developing nations.

⁸ Ruth Andam Zorayda "E-commerce and E-business", e-ASEAN Task Force, UNDP- APDIP, May 2003, p.7.

⁹ The Power Shopper: IOAI Ecommerce Report 2005, available at <http://www.ioaindia.com>.

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SOFTWARE SECURITY ASSURANCE A MATTER OF GLOBAL SIGNIFICANCE: WITHIN THE PRODUCT LIFE CYCLE

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ABSTRACT

The global business world of the 21st century has seen catastrophic financial losses to companies brought on by security breaches. The business world today dictates the urgency and importance of frontend life cycle software security development. The objective of this research is to examine factors impacting security-oriented software development from a holistic product life cycle approach and the outcomes. This conceptual piece puts forth measurable propositions based on literature research and industry expertise as a first step to empirically examining the benefits and cost of a holistic approach to software security development. Findings from the literature and industry expertise clearly indicate the need for early product life cycle development of software security.

INTRODUCTION

This propositional paper is a first step in the process of empirically addressing an immediate and growing strategic business decision as to the benefits of computer software security testing beyond the traditional quality control testing involving functional (i.e., assurance that software functions as it is intended) and load-performance testing to software security testing. The paper focuses primary on the software security testing (formerly known as application security) decision as to cost (i.e., short run and long run) versus benefits within the software development life cycle (SDLC).

TECHNICAL DEFINITIONS

Terminology is important in the understanding of software development and testing. Therefore, the following definitions are offered. Quality Assurance (QA) is the prevention of defects. Quality Control (QC) is the detection (testing) and removal of software defects. Functional testing is the software verification process that determines correct or proper application behavior for only one user. Regression testing is verifying that what was working in a previous application release still works in subsequent releases. Load-performance testing is the process of testing an application to determine if it can perform properly with multiple concurrent users, possibly thousands. Security testing goes much deeper than traditional functional or regression testing. For the purpose of this study, software risk is defined as the combination of the likelihood of a defect occurring and the potential impact of the occurrence. Software security testing verifies correct software behavior in the presence of a malicious attack. Vulnerability is a software error that an attacker can exploit. Therefore, it is important to understand that “software security is not security software” (McGraw, 2004, p. 33).

BACKGROUND

In the past, the role of quality control (QC) testing has, by necessity, focused on testing of application functional and perhaps load and performance testing and not globally on software security. Software security encompasses, but is not limited to software security, security management, planning and operations security, physical security, network, and Internet security. Software security testing involves the person(s) *who* should do the *what* security testing functions.

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Key Words: Software Security, Functional Testing, Software Development Product Life Cycle, Financial Impact

In today's business environment, functional testing of WEB or ecommerce applications or load-performance testing alone is not sufficient (Gallagher, Jeffries, and Landauer 2006). Literature (e.g. Gallagher, et al., 2006) reveals, application functional, regression, and load-performance testing has become more generally accepted as a necessity in the SDLC. On the other hand, application security testing, a vital element of strategic business operations is possibly today's most overlooked aspect of software security and has not yet been given due-diligence.

The tipping point that ushers in the necessity for software security testing beyond the traditional functional and load-performance testing is the additional risk brought on by the globalization and internationalization of markets. The rapid integration of national economies into the international economy comes in part through the spread of technology (Bhagwati, 2007). Companies whether national or multinational, are affected by rapid advances in global technology that has created great opportunities for expansion into new markets and increased revenues. However, along with the benefits of globalization, come negative and sometime unforeseen consequences such as the invasion and theft of business critical proprietary software and data of company secrets, customers' personal data, and possibly the destruction of a company's ability to perform competitively in the global marketplace. Risks have increased through higher levels of integration among business systems such as Customer Relationship Management (CRM), etc.; thus, creating a need for even stronger application security measures to circumvent and prevent extensive financial losses. Therefore, the role of risk-based software security testing (i.e., the probing of risk previously identified through risk analysis) is changing from optional to mandatory.

In order to remain financially sustainable in a globalized economy, software security must be seen as more than a tool; it must be viewed from a systems perspective. Taking a systems perspective, application security is part of a discipline integrated in a total quality management process involving test of the entire software system and not merely parts of the system. Costs associated with poor or inadequate software security have grown rapidly; thus, companies are beginning to invest in security training, automation testing tools, and various associated quality assurance (QA) and quality control (QC) methodologies to circumvent cascading costs that typically occur over the software development process. Cascading costs include cost for: requirements, design, implementation, testing, and production defects. This study proposes that prevention of cascading costs by holistically engaging in global (i.e., systems) security of the software system necessitates that as each new product is developed in the research and development stage of the product life cycle that testing should begin early in the research and development (R&D) phases.

Therefore, this study examines the role of software security testing as a cost reduction of enterprise applications, frontend resource application, and risk reduction methodology in the prevention of the potential for catastrophic financial impact on the company developing the software, and the user of the software application product. This study is a first step, in that, it puts forth measurable propositions that can be addressed through mixed methodologies such as surveys, in-depth interviews and focus groups of software test engineers, managers, and clients across a wide-variety of companies and industries.

LITERATURE REVIEW

Sustainability, by its very nature, involves using resources of the company in such a manner that the company remains financial sustainable over time. Moreover, to reduce security risk, development of risk management must begin in the first stage of the SDLC.

A financially sustainable company wisely plans the use of limited-resources (i.e., materials and human capital); thus, to be sustainable means planning for security of software must begin in the research and development (R&D) stage of a product's life cycle. The product life cycle as defined by Kotler and Armstrong (2011), begins in the research and development stage (i.e., product development) of a product's life. This is a time when expenditures may be high and sales are zero. From this stage, the product enters the introductory stage, in which sales growth is slow, marketing costs are high, and expenses heavy. From there the product enters its growth stage and then there is a maturity period that leads into the final stage known as the decline stage (Kotler and Armstrong 2011). However, not all products follow this typical life cycle and many go into decline rapidly for various reasons. These products are financial failures for the company. On this premise, benefits gained through early defect prevention enabled by early automated testing in the R&D stage of the product life cycle are expected to significantly outweigh the financial costs involved in fixing the problems later, loss of business, and/or negative word of mouth and possible lawsuits.

Through the vulnerability of the product comes vulnerability of the company. Attacks may occur at any stage in the product's life cycle; however, it is proposed that protection must begin as each product idea enters the development stage of its life cycle. It is here where cascading costs can be circumvented by implementation QA and QC best practices. Once the product is introduced into the market, the risk is then shared between the development company and the company implementing the product (i.e., software). However, the risk to the development company may be the greatest. Customer satisfaction with the quality of the product is measured in performance (i.e., ability to perform its functions) and conformance (i.e., freedom from defects), while high quality also involves consistency in the product's delivery of benefits that meets the customer's expectations). If the product meets or exceeds performance and conformance, but does not function at the level of the customer's expectations consistently, the customer is negatively disconfirmed. Hopefully, the customer will complain and not merely switch providers. However, the perception of the likelihood of a successful complaint means that the complaint must result in a corrected or changed situation. Perceived likelihood of success comes from the customer's perception of the company's fairness of the procedures and policies in arriving at a remedy, the remedy itself, and the perception that the treatment has been delivered in an acceptable manner (Homans 1961, Lind and Tyler 1988). Thus, many companies' software development involves augmenting the product with product support and after sale service, yet this may not be enough if the overall costs of the defects to the buyer are too high or too often (e.g. when defects cause excessive loss in time, productivity, and money).

Tax, Brown, and Chandrashekar (1998) found that if complainants believe that they have not been successful in gaining resolution to the problem, then they have a propensity to engage in negative word of mouth or exit the relationship. If the problems persist and/or the company does not respond quickly and in proportion to the problem, the customer may abandon the product and the company, which results in a financial loss to the company. Moreover, even greater damage comes from negative word of mouth advertising from the dissatisfied customers. In today's electronic age, negative word of mouth spreads at Internet speed and the result to the company can be catastrophic. Thus, engaging in holistic (i.e., systems) software security testing in the developmental stage of the product by identifying risks to the company from what may be perceived as the smallest threat, gives the company the potential by which it can avoid immediate and long-term financial risks.

A risk analysis for the development company, by its nature, must assess risk costs based on the actual risk, the size of the risk (as to the extent of cascading affects), its immediate and long-term impact on the company's sustainability, prevention costs (i.e., personnel, software packages, etc.) verses benefits to the company in the short and long run. In the short run, upfront costs come from the purchase of automated software testing tools ranging in cost from \$5,000 - \$250,000+ for tools, plus typically 20% for annual maintenance. Additionally other expenses typically include a set amount of tool specific training factored into initial costs. Regarding human capital costs, depending on where software quality assurance testers are located, salaries fall in a range of \$35,000 - \$60,000 annually for full time manual tester. Automated software testing is a highly specialized area within the computer science field and requires extensive tools training as well as a minimum of a four-year computer science degree. Therefore, companies often hire automated software consultants. Consultants are used for short-run initiatives and a company may pay an automated testing software engineer anywhere from \$60,000 to \$150,000 annually plus travel and expenses. These consultants' contracts typically run from three months to a year depending on the project and the company perceived needs. The consultants are often contracted for companies that have short-term needs such as developing an automated testing framework, or load and performance testing. The variation in salary is based on the software engineer's expertise with automated testing tools, experience in the field, educational degrees, and the level of risk associated with the company's product (e.g., medical supply companies such as Baxter Health Care must, by the nature of their product and the level of risk to the client and the company, hire extremely talented, competent, and experience automated test engineers).

Therefore, frontend quality assurance (QA) provides significant value (i.e., cost verses benefit) with regard to reducing defects and costs of all software, including security testing. Study after study, such as the study by Pressman (2005) "Software Engineering: A Practitioner's Approach," have shown that as a defect progresses from requirements to the next phase of the software development life cycle (SDLC), the approximate cost of fixing a defect increases by a factor of ten at each phase of the SDLC. According to National Institute of Standards and Technology (NIST), 80% of costs in the development stage are spent on finding and fixing defects. Further, the NIST suggests that a preemptive approach of building security and compliance into the frontend product reduces vulnerability and costs less in the long run (Anonymous 2009). In other words, by the time a defect makes it through requirements, design, development, testing, and to production, the cost of fixing the defect increases exponentially.

Early stage (i.e., R&D) specification of software security requirements, designing and coding are likely to provide a substantial cost savings by preventing security bugs rather than bug fixes after the software application is in production. Although planning for security risks begins in the development phase, it must be assessed and controlled throughout the products life cycle. Once the quality control (QC) testing phase is entered, having automated tests ready to go, including automated software security test cases, dramatically improves the ROI garnered from the testing phase. If automated tests are developed during the SDLC as well as with each software release, the test team will have a significant inventory of automated tests, both functional and software security. The larger the inventory of automated tests the more efficient and effective the test phase will be in addition to securing a higher ROI over manual testing. Hence the following is proposed:

- P_{1a}: Inclusion of frontend software security features reduces total cost of enterprise applications.
 P_{1b}: Testing of frontend software security features reduces total cost of enterprise applications.

PROPOSED IMPLEMENTATION PLAN

A security issue, in the QA/QC world, is viewed as a defect, but one with a very high risk. The tester should use a risk-based approach to software security development with architecture in mind, and they must identify risks to the application and focus on areas of code that may be vulnerable to attack.

For some companies, in addition to frontend costs to prevent incidents, the perception of how significant a security risk is for that company plays a key role in whether frontend QA is implemented. Therefore, typically, one of the first tasks to be completed in the software development process is a risk analysis. Likewise, in testing software security, a high priority is given to performing an effective analysis of software security risks. It is a generally accepted fact that it is impossible to test everything in an application, including security. To identify and test software security, a test engineer must add to their current testing knowledge the mindset of a ‘hacker’ and move beyond the conventional QA/QC testing mindset. The software security tester must: 1) apply conventional QA/QC testing methodology, 2) thoroughly understand what is being tested, 3) think outside the box (i.e., maliciously about the target software or module), 4) attack the target software by applying malicious ideas, methods, and data, and 5) stay informed about potential threats that might affect the testing target (Gallagher et al., 2006). To address strategic risk through conventional analysis allows the analyst to prioritize what risks need to be addressed according to their risk level. However, a company must obtain and maintain both conventional security and quality assurance risk assessment measures while engaging in unconventional thinking in order to secure the company’s financial sustainability.

One effective means for visualizing the likelihood and the potential impact of a defect is through a table format with defect likelihood on one axis (e.g., rows) and potential impact of the defect on the other axis (e.g., columns). Characteristics of the risk can be prioritized as to impact on systems or critical software and recovery using a weighted risk. It is necessary to define the weighs as to the meaning of critical, high, medium and low for each risk. See Table 1 below.

Table 1 Risk: Likelihood and Impact of Defect

Impact			
Likelihood	Catastrophic	Damaging	Annoyance
Unavoidable	C	H	M
Likely	C	H	L
Rare	H	M	L

Weighted Risk: C = Critical, H = High, M = Medium, or L = Low

One security model utilized to assess risk, given credence by Certified Information Systems Security Professionals.Com (Cissp.com 2010) and the computer security community at large is the CIA model which is an acronym for: 1) confidentiality – who has access to your software and data, 2) integrity – is the software functioning accurately and is the data accurate, and 3) availability – can authorized users access the software get to the application and data?

In order to create a viable software security test plan, a list of all threats to critical functionality should be compiled. The list of entry points should include all possible means as to how the data is used and how it might be used maliciously to cause undesirable results and threats to critical functionality (Wright, 1994).

Once risks have been identified, the next logical step is the planning stage. Planning is a key to success in any software endeavor. In the book, *Hunting Security Bugs* (Gallagher, Jeffries, and Landauer 2006), the authors provide a *threat model*, to assist practitioners in planning the software security-testing task. The *threat model* has three key parts: 1) data flow diagrams (DFD), 2) enumeration of entry and exit points, and 3) enumeration of potential threats.

According to the threat model, data flow diagrams (DFD's) provide testers with a clear understanding of how, where, and what data flows between software components. DFD's can be used for the entire application, or perhaps just specific functionality. Data objects of particular concern are: personal information, account numbers, passwords, and data from anonymous sources. Additionally, DFD's highlight the functional areas that require specific sensitive information, or perhaps generate explicit sensitive information (Gallagher et al., 2006).

Entry points are susceptible to malicious data entering the application, and as such, should be thoroughly tested (e.g. negative testing). Malicious data may be used to 'unlock' a module, function, or method allowing an unauthorized user to further misuse the application and or its data. Typical security concerns of this type are: 1) controlled access (customers and employee business), 2) confidentiality protection (disclosure of sensitive information), 3) integrity of data (protection from unauthorized modification), 4) non-repudiation of data (original data or audit controls), and 5) monitoring and auditing security process and procedures (Gallagher et al., 2006). Exit points of particular interest include: 1) business objects (especially those regarding security), 2) organization information (user roles, etc.), 3) process components (including data structures), and 4) partners (and relationships) (Gallagher et al., 2006).

Once risks are assessed and identified, utilizing a gumball approach for software application security is proposed as a best practice and preferred over an approach of putting all of the security eggs in one basket (e.g. firewalls). The gumball model uses layers of security, much like an onion. Due to the risk involved, the Transportation Security Administration (TSA) uses this methodology to implement several security screenings and checks (J. Whitney Bunting College of Business 2007). By using the gumball implementation methodology, the malicious user is unlikely to know how many layers he or she must go through to get to what they want, and may be more inclined to move on to another easier target. One important thing to remember is that software security does not stop at the borders; therefore, the deeper the hacker must go to get to their desired goal, the less likely they will be successful.

For management another strategic security decision is whether to implement computer security at the infrastructure level or with security code in each application. To ensure success in securing computers and applications, strategic decisions should once again take a systems approach by considering the roles of people, processes, and technology (Nagaratnam, Nadalin, Hondo, McIntosh, and Austel, 2005). Intuitively, software security testing can provide a vital role and feedback in the generally accepted (Security) Process Engineering model of: Plan: 1) plan – create security processes (QC the processes before implementation), 2) establish metrics (QA, provides feedback on what metrics will work well and which may not), and Do: 1) implement the security plan (QC tests software security per implementation), and Check: 1) measure and monitor (QC, software security defects and issues), and lastly, Act: 1) review and improve software security (QA provides statistics on software security test results), and 2) improve continuously (QC provides information on what was good, bad, and ugly).

Based on 20 plus years of experience in the quality assurance/quality control (QA/QC) testing field and on existing data, it is proposed that the aforementioned software security categories are vital to the success of a company's business performance and should be viewed holistically to provide a comprehensive software security solution. Based on research as to the above-recommended frontend resources, the following is proposed.

P₂: Incorporating software security features into the research and development phase results in lower costs and less security risks than developing software security features later in the product life cycle.

It has been said that those who do not remember history are doomed to repeat it. Some companies that have fallen victim because of the absence of software security include: Volkswagen (loss of \$260 million to an insider scam of phony currency-exchange transactions), Bank of New York (\$32 billion lost due to a processing error), hackers victimized Southwestern Bell and other companies, Southwestern Bell alone reportedly spent \$370,000 to repair

programs and add software security. The fate of these companies should be “red flags” for others. In spite of the losses to the companies that use the product, it is obvious from previous research that the catastrophic risk belongs to both the company that developed the software to the company that uses the software. However, the greater loss and risk fall on the developing company. Nevertheless, the risk exits for both. Therefore, the following are proposed:

- P_{3a}: Inclusion of software security features into the enterprise application reduces the risk of catastrophic financial impact on the company that develops the software.
- P_{3b}: Inclusion of software security features into the enterprise application reduces the risk of catastrophic financial impact on the client.

CONCLUSION AND MANAGERIAL IMPLICATIONS

Although research exists in automated software testing, the benefits of a systems-testing approach, relative to early production development and life cycle testing have received little attention by academics or practitioners. The cost of ignoring a systems approach to life cycle security testing can be ruinous to the developing company and/or the customer. It is further recognized that software application security is one of the greatest concerns of many software organizations and yet one of the least understood and implemented testing tasks. Software security testing is very different from functional or load-performance testing and as such requires a domain of expertise far beyond conventional testing methods and practices (Gallagher et al., 2006). However, the benefits of the inclusion of software security testing relative to cost savings through frontend of mainstream of the QA/QC testing phase of the SDLC is of foremost importance in averting security risks across many types of the software applications. Nevertheless, building security into the frontend does not mean that security issues can be forgotten throughout the product life cycle. However, this does have the potential to reduce the cost associated with application software security, as well as traditional software vulnerabilities.

To fully investigate the propositions brought forth in this paper, interviews should be conducted across industries, companies, managers, and software engineers. Findings from these interviews could be used to create an appropriate survey instrument to capture a larger sample. The full investigation of the propositions is expected to add value to strategic management decision making by revealing the extent of the benefits of life cycle testing.

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MANAGEMENT AND SOCIAL NETWORKING: CHANGING ROLES

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ABSTRACT

Contemporary technologies have engendered the emergence of a number of global information systems. As such, the world has been reshaped into a distributed network where disparate populations collide exchanging information and potentially creating a synergistic effect (Cohen, 2009). Exemplifying this transformation is social networking, which has become a phenomenon that is now firmly ingrained in our personal and professional lives, as well as contemporary business practices. The proliferation of social networking is causing business executives to consider ways that organizations can make profitable use of social networking applications especially in the areas of consumer research, advertising/communications, inter and intra organizational communications, organizational behavior, product marketing, human resources, community building among employees, increasing employee engagement and motivation, and internal process management (Kaplan and Haenlein, 2009, Doherty, 2010, Kilduff and Brass, 2010). This study seeks to examine management implications of social networking sites. Procedures involved include: an overview of the existing literature; analysis and presentation of site analytics and growth rates; and distribution, and analysis of an online survey.

BACKGROUND

The concept of social networking not only pre-dates the internet but played a role in inspiring the development of the internet. The earliest mention of a social network was in 1962 when J.C.R. Licklider, head of the computer research department at the Defense Research Projects Agency (DARPA) discussed the concept of a “Galactic Network” comprised of a globally interconnected set of computers through which individuals could share information (Leiner et al, 2010). Many experts believe that the first online social networks were Usenet newsgroups. Usenet is a global Internet discussion system that was designed and introduced in 1979 by two Duke University graduate students. Usenet allowed individuals to form distributed newsgroups that exchanged email like messages known as articles. Newsgroups still exist today, and it was through Usenet that in 1989 Tim Berners-Lee announced the launch of the World Wide Web (Reid and Gray, 2007). The first of the modern social networking sites, Classmates.com, was introduced in 1995 and remains online today. It was closely followed by Friendster.com and Six Degrees.com, both launched in 1997 (Dwyer, Hiltz & Widmeyer, 2008). Causing a paradigm shift in modern life, the giants of the social networking community, MySpace and Facebook were introduced in 2003 and 2004 respectfully.

Social networking related activities have come to dominate Web 2.0. The statistics are startling for example: YouTube is the second largest search engine on the Web, 3.5 billion pieces of content are shared each week on Facebook, 96% of 18-35 yr olds are on a social network, 25% of search results for the World’s top 20 largest brands are links to user generated content (Morejon, 2010).

Using site analytics available from Compete.com (2010), the top 10 overall Websites for April of 2010 are ranked according to a number of criteria. Table 1 considers the ranking in terms of number of visits. In April of 2010, Facebook saw a 16% positive monthly change from while MySpace declined by 27%. The positive or negative percentage of change has been color coded. When double digit positive growth exists the amount is coded green, when single digit growth exists the amount is coded in yellow, and when negative growth exists the amount is coded red.

Calculated Using Site Analytics from Compete.Com			
Rank	Domain	Number of Visits	Monthly Change
1	Facebook.com	3,165,316,934	16%
2	Google.com	2,595,286,388	0%
3	Yahoo.com	2,268,776,335	11%
4	Live.com	1,257,292,124	32%
5	Msn.com	1,007,844,033	21%

6	Youtube.com	603,580,687	-12%
7	Aol.com	508,518,565	0%
8	Ebay.com	491,140,387	-4%
9	Craigslist.com	398,706,054	-3%
10	Myspace.com	332,092,139	-27%

Facebook currently has the dominant share of the social networking market and is not just the number one ranked social networking site, but one of the most popular web site on the internet (continuously in the top 5). As of early 2010, there were 400 million Facebook users world-wide with 141,901,780 users in the United States (Kazeniak, 2010). Meanwhile, membership in, and usage of, MySpace remains on a continuous decline.

Facebook continues to grow in popularity across the globe. Seventy percent of Facebook users are international. However, when the top 20 countries were considered the U.S. was shown to have the largest number of users followed by the UK, Indonesia, Turkey, and France. If growth rate is considered Taiwan has the highest rate of growth at 2872%, followed by, the Philippines at 1027%, Brazil 810%, Indonesia 793%, and India 400%. (Burcher, 2010).

Facebook is a privately held company whose business model is based on the sale of advertising space and premium subscriptions. As of June 4th, 2010 Facebook had more than 400 million active users, 50% of whom are logged on daily (Facebook.com, 2010). According to Facebook, the average user has 130 friends all of whom can be reached via word of mouth advertising (Facebook, 2010). Further, Facebook explains that there are over 160 million pages, groups, and events available for member interaction, the average user is connected to 60 fan/group member pages, the average user contributes 70 items per month, and there are more than 25 billion pieces of content (URLs, news, blog posts, images, etcetera) exchanged each month (Facebook, 2010).

Management Implications of Social Networking

Management is concerned with the dynamic capabilities of an organization or “appropriately adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competences to match the requirements of a changing environment (Teece, Pisano, and Shuen, 1997, p. 515).” As the business environment changes and new skills and resources emerge, organizations must adapt and evolve in order to retain their competitive advantage (Avanade, 2008). Social media have reached a crucial turning point and are now acknowledge as “a powerful means of communications, collaboration, and knowledge sharing for large and small businesses (Avanade, 2008, p.1).” The full impact on the business environment is still unknown and many benefits yet fully recognized; however, a growing number of organizations are recognizing that adaptation will be necessary.

The literature suggests that social networking activities can enhance: social capital, stakeholder engagement, public perception and awareness, customer and community relations, internal and external communications, employee motivation, employee commitment to the organizational mission, team and community building, and collaboration (Doherty, 2010; Kilduff and Brass, 2010; Haithi, 2009/2010). As a result of these positive implications a new paradigm in management will emerge in the next few years that will involve a new understanding of many traditional management activities.

A whitepaper published by Avanade, Inc (2008) that examined the experiences and perceptions of over 540 executives across Europe, Asia, and North America found that there is clear evidence that social media will have an enterprise-wide impact on companies benefitting them in terms of public perception, enhanced communication processes, and relationship management.

Efforts to build communities of practice among employees, work teams, and other stakeholder groups can be supported by online social networking (Doherty, 2010) realized through the strategic interactions, interpersonal connections, and communications that social media support (Kilduff and Brass, 2010; Haithi, 2009/2010). Further, social networking systems transcend many traditional geographic, social, and cultural boundaries (Haithi, 2009/2010).

Grasz (2010) looked at the usage of social networking sites by hiring managers finding that 22% of hiring managers use social networking Websites to screen job candidates. Out of those using the sites for screening, 34% reported that they found information about a candidate that caused them not to hire a particular person, and 24% found favorable information about a candidate that positively influenced their hiring decision.

Use of social networking sites in business practices is not without risks. Excessive time spent on social networking sites by employees while in the office has proven to be a problem, as have issues of violation of privacy,

inappropriate behaviors, offensive content uploads, and unauthorized disclosure of proprietary information (Doherty, 2010; Elzweig, 2009). Barnes and Barnes (2010) warn about legal concerns such as the disclosure of financial information that may violate SEC directives, identify theft, copyright and trademark issues, and improper access/release of employee/customer confidential personal data. Further, in the area of marketing, misappropriation of brand image, site sabotage, negative or hostile postings, and other potentially damaging threats are a concern

There is an urgent need for more research that examined the implications of social networking on organizations. According to Serrart (2009)

“When they succeed, social networks influence larger social processes by accessing human, social, natural, physical, and financial capital, as well as the information and knowledge content of these. (In development work, they can impact policies, strategies, programs, and projects— including their design, implementation, and results—and the partnerships that often underpin these.) To date, however, we are still far from being able to construe their public and organizational power in ways that can harness their potential (2009, p. 1).”

RESEARCH

A short instrument with 7 Likert scaled questions was developed in Zoomerang and piloted in May of 2010. It was distributed to 486 management professionals via an email sent through the Zoomerang system. Additionally, another 200 individuals were sent a link to the survey via Facebook. In total, 260 people completed the survey.

According to the findings having a presence on an online social networking site is important for a company (3.59/5) and contemporary executives need to be well versed in the power of social networking (3.74/5). Participants largely agreed that social networking sites should be used by companies to help build their identities (3.4/5) and almost all participants agreed that companies should establish acceptable use policies for employee behavior on social networking sites (3.78/5). Respondents were undecided when it came to whether companies should check a candidates social networking activities before they are hired (2.95/5). Participant were in slight agreement that social networking sites should be used by managers for community building (3.17/5); however, most agreed that as a management professional social networking sites a great resources for making important professional contacts and promoting my professional skills and achievements (3.35/5). Table 2 expresses the full results.

Table 2: Social Networking Survey Results						
1. Having a presence on online social networking sites is important for a company						
1 Strongly Disagree		6		2%		
2 Disagree		32		12%		
3 Neutral/Undecided		62		24%		
4 Agree		122		47%		
5 Strongly Agree		38		15%		
Total		260		100%		
	Mean	Median	Mode	Range	Standard Deviation	Standard Error
	3.59	4	4	4	0.96	0.06
2. Contemporary executives need to be well versed in the power of social networking						
1 Strongly Disagree		8		3%		
2 Disagree		22		9%		
3 Neutral/Undecided		48		19%		
4 Agree		128		50%		
5 Strongly Agree		50		20%		
Total		256		100%		
	Mean	Median	Mode	Range	Standard Deviation	Standard Error
						Confidence Interval

							@ 95%
3.74	4	4	4	0.97	0.06		[3.62 - 3.86]
3. Companies should use social networking sites in order to build and maintain their identity							
1 Strongly Disagree		15	6%				
2 Disagree		31	12%				
3 Neutral/Undecided		74	28%				
4 Agree		116	45%				
5 Strongly Agree		24	9%				
Total		260	100%				
Mean	Median	Mode	Range	Standard Deviation	Standard Error	Confidence Interval	@ 95%
3.4	4	4	4	1.01	0.06		[3.27 - 3.52]
4. Social networking sites are a good way for managers to build a sense of community with employees							
1 Strongly Disagree		17	7%				
2 Disagree		55	21%				
3 Neutral/Undecided		70	27%				
4 Agree		102	39%				
5 Strongly Agree		15	6%				
Total		259	100%				
Mean	Median	Mode	Range	Standard Deviation	Standard Error	Confidence Interval	@ 95%
3.17	3	4	4	1.04	0.06		[3.04 - 3.29]
5. Companies should establish acceptable use policies for employee conduct on social networking sites							
1 Strongly Disagree		12	5%				
2 Disagree		13	5%				
3 Neutral/Undecided		47	18%				
4 Agree		137	53%				
5 Strongly Agree		51	20%				
Total		260	100%				
Mean	Median	Mode	Range	Standard Deviation	Standard Error	Confidence Interval	@ 95%
3.78	4	4	4	0.97	0.06		[3.66 - 3.90]
6. Before hiring a new employee management should check each candidate's social networking activities							
1 Strongly Disagree		35	14%				
2 Disagree		53	21%				
3 Neutral/Undecided		72	28%				
4 Agree		83	32%				
5 Strongly Agree		13	5%				
Total		256	100%				

Mean	Median	Mode	Range	Standard Deviation	Standard Error	Confidence Interval @ 95%
2.95	3	4	4	1.13	0.07	[2.81 - 3.08]
7. As a management professional, I consider social networking sites a great resources for making important professional contacts and promoting my professional skills and achievements						
1 Strongly Disagree		15	6%			
2 Disagree		48	18%			
3 Neutral/Undecided		59	23%			
4 Agree		107	41%			
5 Strongly Agree		31	12%			
Total		260	100%			
Mean	Median	Mode	Range	Standard Deviation	Standard Error	Confidence Interval @ 95%
3.35	4	4	4	1.09	0.07	[3.22 - 3.48]

Future Research

As social networking continues to grow unabated it is posed to redefine many aspects of business including, but not limited to, new employee recruitment, talent management, team and community building, organizational behavior, brand management; consumer behavior research, and marketing. Timely and continued research on the impact and potential of social networking in business practice is crucial to the discipline. Further, it is an emerging area that demands investigation. The research study has been expanded with a much larger instrument and a significantly larger population size. The new protocol represents the most exhaustive examination to date. As a result, the contribution will be significant as it helps to fill a large gap that currently exists in the social networking literature. The results and framework offered will hopefully help to shape and inspire future research studies on the impact of social networking on management.

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EFFECTIVE GOVERNANCE THROUGH INNOVATIVE USE OF ICT - A CASE STUDY OF PPP MODEL OF EGP PROJECT OF A.P., GOVERNMENT OF INDIA THE BEST PRACTICE

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ABSTRACT

*Electronic-Procurement Project of “Andhra Pradesh, Government of India” is an innovative project of Information & Communication Technology capable of funding all e-Governance projects of India. It is an e-Governance Project with a direct Return On Investment(ROI). Even if one Billion Dollar of purchase goes through e-Procurement and we save just 10% of the cost of purchase, that works to savings of \$100 million. It would be enough to justify all the e-Governance Projects of India. Andhra Pradesh is the third largest state in India. It has a population equal to Germany’s 80 million and an annual procurement budget of about US\$2 billion, excluding special developmental projects. The state aspired for a **CARING**(Committed, Accountable, Responsive, Inspiring, Nationalistic, Genuine) Government. The obvious solution was to computerize the entire procurement process. This project has bagged the prestigious United Nations Public Service Award for 2007 for improving transparency, accountability and responsiveness in the public service.*

The paper analyses the business model, technology, financing, risk associated, cost benefit analysis of India’s most successful e-Governance project. The parameters behind its success has also been exhaustively dealt with facts and figures.

Keywords: eGP → Electronic Government Procurement, PPP → Public-Private Partnership, ROI → Return on Investment

INTRODUCTION

e-Procurement is one of the attractive quick-wins in e-government plans of the countries which have taken the initiative of introducing the e-governance. e-Procurement has started growing in most European Union countries and is being driven by a renewed focus on cost cutting, different sourcing practices, and quantifiable benefits of implementations. e-Procurement is related to different aspects of the procurement function supported by various forms of electronic communication.

In fact, e-Procurement is the value-added application of Internet and e-commerce solutions to facilitate, integrate and streamline the entire procurement process, from buyer to supplier and back. e-Procurement might be interpreted as the procurement macro-process developed with the help of Internet Technologies. e-Procurement is one of the highlights under Core Integrated Services Projects in the National e-Governance Action Plan of India.

2. LITERATURE REVIEW

DEPLOYED FOR (SOCIAL CONTEXT)

2.1 World Bank Country Procurement Assessment Report, 2002 on performance of public procurement in India⁵

The study was carried out in three phases by World Bank. The first phase covered the Central Government and its agencies, second phase covered three State (Tamil Nadu, Karnataka, Uttar Pradesh) Governments selected as representative of all the States and UT; the third phase covered the 250 plus Public Sector Enterprises under the Central Government. The report presents a total picture of public procurement in India, its strengths and weaknesses and the recommendations for improvement and modernization.

KEY FINDINGS

- **The total value of public procurement by ministries, departments, municipal & other local bodies, statutory corporations & public undertakings both in center and in state put together is of the order of US \$100 billion representing 13% of the national budget and over 20% of the Gross Domestic Product (GDP).**

- **Going by a conservative estimate even 10% savings through e-Procurement can boost the economy by about 2% of GDP.**

[exchange rate of US \$1 = Rs45.00 at the time of study]

2.2 e-PROCUREMENT BENCHMARK REPORT-04 BY *ABERDEEN¹³

KEY FINDINGS

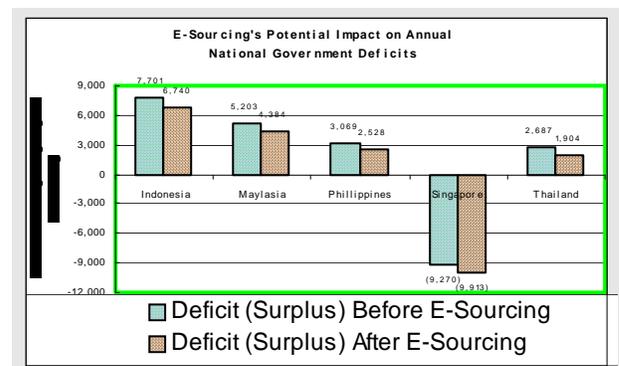
- Reduced requisition-to-order cycles by 66%
- Reduced requisition-to-order cost by 58%
- Cost Reduction : up to 25% or more
- Anti-corruption tool: promotes transparency
- Better Access: Any firm (small/medium) may participate in national or international markets.
- Prevents formation of cartels in bidding for tenders
- Real Time Monitoring

2.3 Key findings of White Paper dated 06.08.03 on e-sourcing by International Association of e-Government professionals in association with US-ASEAN Business Council⁴:

Estimated level of savings –

- 10% – minimum level of savings expected
- 16% – average level of savings expected
- 35% – maximum level of savings expected

The study was based on the impact of e-Procurement in *five* Asian countries (Indonesia, Malaysia, Philippines, Singapore & Thailand)



3. DATA AND METHODOLOGY

The study utilizes the primary data gathered from ICT Department of Andhra Pradesh and secondary data from the Private party (C1 India) in the year 2006. Questionnaires were issued to the Suppliers as well as the buyers to study the impact of the project on the users. The data was thoroughly studied and analyzed based on various parameters like supplier participation for better competition, anti corruption tool, better transparency and accountability, paperless office, tremendous cost saving, reduced project cycle etc.

In most of the cases it was realized that this innovative step by the government in terms of public private partnership is yielding much better results beyond expectations.

3.1 IMPLEMENTATION CHALLENGES¹⁵

The Government of Andhra Pradesh's annual expenditure on procurement through normal programs is to the tune of \$2 billion a year. This figure has now risen, as the government of Andhra Pradesh is investing around \$10 billion over a five year period in creating irrigation sources through a special program named as 'Maha Jala Yagnam'. The challenge before the government was to select a sustainable business model. There were several

* AberdeenGroup is the technology driven research destination of choice for the global business executive. Through its continued fact-based research, benchmarking, and actionable analysis, it offers global business and technology executives a unique mix of actionable research, KPIs, tools, and services.

The sample consisted of 42% from North America; 10% from Asia-Pacific region; 6% from Latin and South America; 2% from Middle East and Africa; 40% from Europe.

options available such as :Government owned – Government operated, Government owned – operated by a private operator ,Public Private Partnership.

- Ensure Interdepartmental Coordination
- Change Management Adoption
- Security and Authentication

3.2 TECHNOLOGY USED¹⁶[Website: www.eprocurement.gov.in]

The project has been built on n-tier architecture:

- **Presentation Tier-** The presentation tier is supported by two load- balanced Web servers running the Microsoft Windows® 2000 Advanced Server operating system and Internet Information Services version 5.0. The Web servers are hosted on two HP ProLiant DL580 dual-processor computers with 2GB of RAM and RAID 5 features. The Web servers are isolated by external and internal firewalls, creating a perimeter network. It provides the front end for the e-procurement portal.
- **Business Logic Tier-** The business logic is encapsulated using Microsoft Com+ technology and handles a range of tasks, including authentication, authorization, and workflow management. The business logic tier is cohosted on the same servers that support the presentation tier.
- **XML Data Layer Tier-** The XML data layer handles communication with Web services. The XML data layer is cohosted on the business logic tier.
- **Database Tier-** the 60-GB relational database runs on Microsoft SQL Server™ 2000 Enterprise Edition, part of Microsoft Windows Server system™ integrated server software, and Windows 2000 Advanced Server. The database is hosted on two HP ProLiant DL 580 dual-processor computers with 2GB of RAM and RAID 5 features. The servers are configured in a two-node active/passive cluster to ensure high availability. Storage is on a System Area Network. The Hyderabad production site is backed by a disaster recovery site in Delhi. It also runs on two hardware servers, configured in a two-node active/passive cluster to ensure high-availability.

3.3 FINANCING⁹:

It is based on Public-Private Partnership(PPP) model. C1 India(Private party) invested in developing the web-based electronic procurement software, hardware, security and hosting of the solution. C1 India is also responsible for administration, operation and maintenance of the complete e-Procurement market place. C1 India operates the e- Procurement market place as an application service provider, saving the government the cost of deployment, administration and maintenance. The Private party(C1 India) is compensated through a small transaction fee paid by vendors using the system. C1 India receives 0.24% as transaction fees on the total volume of each project besides which it charges Rs4,500 as hosting fee for each tender.

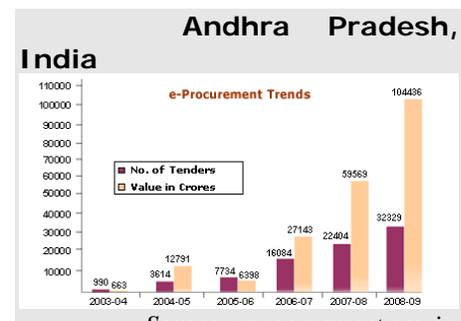
4. RESULTS AND DISCUSSION

4.1 BENCHMARK/EVALUATION OF THE PROJECT¹⁶

In fact, so successful has been the e-procurement practice that the total amount spent by the Andhra government on 1,212 projects amounting to an estimated Rs 2,801 crore is 22% lower than its own estimations.

4.1.1 The e-Procurement project of the Andhra Pradesh Government has bagged the prestigious United Nations Public Service Award for 2007 for improving transparency, accountability and responsiveness in the public service.

4.1.2 This project has been awarded the PC Quest's award for India's Best IT Implementation of the year 2005 under *Maximum Social Impact Category*.



4.1.3 Awarded “Standardization, Testing and Quality Certification” by the Department of Information Technology, Government of India. STQC provides cost-effective International level Assurance Services in Quality and Security on a national level to Indian industry and users, 2004.

4.1.4 Awarded “Golden Icon Award” for “Exemplary Implementation of e-Governance Initiative” by the Department of Administrative Reforms & Public Grievances, Government of India, 2003

4.2 BENEFITS TO THE GOVERNMENT¹⁶

4.2.1 Reduction in tender Cycle Time: The tender cycle time used to be 90 to 135 days in manual system. After the implementation of e-Procurement portal the tender cycle time has come down to an average of 42 days over a period of one year of its implementation and further reduced to 35 days at the end of the second year.

4.2.2 Cost Saving

The huge cost saving is due to reduction in process cycle, advertisement cost, ** reverse auction. There was an average reduction of 20% in cost for the procurement transactions done through the exchange during the year 2003-04 and 12% in 2004-05 due to a competitive environment.

Reduction in the advertisement costs as Notice Inviting Tenders contains only basic information on the name of work, estimated costs and the URL of the e-Procurement site. *There has been a 25% saving in the column space used, resulting in savings of approximately \$0.56 million in a year.*

4.2.3 NO RISK¹⁴

Entire risk was covered by the private party as it bore the cost of deployment, administration and maintenance of the infrastructure. Moreover, no specific revenue was guaranteed to the Private Party. The Private Party had an assurance from the government that all procurements above \$25,000 will be done through this portal only. Government is absolute owner of the data and it also reserves the right to buyout the software and the hardware at a pre-specified written down value at the end of the present contract period.

4.3 ADVANTAGES TO THE PRIVATE PARTY

The Private party (C1 India) is compensated through the transaction fee paid by vendors using the system. The Private Party receives 0.24% as transaction fees on the total volume of each project besides which it charges \$100 as hosting fee for each tender. all procurements above \$25,000 by Government departments, Public Sector Undertakings and Local Government bodies done exclusively through this portal.

4.4 ADVANTAGES TO THE SUPPLIERS/BIDDERS

In Pilot Phase no charges was levied on the suppliers but in rollout phase every participating bidder has to pay a transaction fee @ 0.04% of tender value, with a maximum cap. The transaction fee structure payable by a bidder is set up to be less than the tender fee charged in the manual tender system. Online updation of bid available till the closing date of the bid is inbuilt feature of the infrastructure. There is also provision of real

** *Reverse Auction: Before the closed bids are opened, an online reverse auction is conducted and the bidders have a choice of revising their closed bids. During the reverse auction process, the bidders get to know only the prevailing lowest bid at any given point of time, and the identity of the other bidders, including the one with the lowest bid, is kept a secret. The reverse auction process starts from a floor price fixed by buyer, and bidders can quote rates lower than the floor price. The bidders can enter their bids from any place of their choice. The user name & password given to them regulate their entry into the auction rooms. After the online reverse auction is completed, the lowest bid therein is determined.*

time availability of tender status which results in Supplier Empowerment. The suppliers get information of all tenders available at one place. Thus the bidder could decide which tender they need to participate.

4.5 APPROXIMATE SPENDING

4.5.1 Approximate Government Spending

The government had spent around Rs0.55 million on training, Rs7.2 million on hardware and Rs16.2 million on Project Study. About 15% of expenditure on Project Study can be apportioned for the e-procurement project as PriceWaterhouseCoopers was engaged to study the e-Governance road map and blue print for 50 major departments, identify 5 core projects. However, during the pilot phase the government had spent \$0.62 million as hosting charges (@\$101.6 per tender). Transaction fee @0.24% on the completion of the transaction. In the Rollout phase(July 2004) burden was shifted from the government to bidders, with every participating bidder paying a transaction fee @0.04% of tender value, with a max cap.

4.5.2 Approximate Expenditure of the Private Party

The private partner has incurred a capital expenditure of \$1.12 million on software and hardware, and an operational expenditure of \$0.54 million per annum on the e-Procurement platform.

CONCLUSION

Technology cannot be the only strategy. One must have a procurement strategy in place and utilize e-Procurement to support it. Cost optimization and process efficiency offered by e-Procurement is not sufficient to assure success. As with new business initiative, companies have to overcome process, technical and cultural blocks to be able to implement a successful e-Procurement solution. Though the government of India has made mandatory publishing of tender details on the Websites of the organizations/departments, the support of employees to e-Procurement is crucial to its success. The departments are even expected to publish monthly summary of contracts/purchases made above a threshold value on the website, the details of all such cases regarding tenders or out of turn allotments or discretion exercised in favor of an employee/party, details regarding actual date of start of work, actual date of complete and reasons of delays if any to promote transparency and to curb corruption.

The Multilateral Development Banks viz- the World Bank, the Asian Development Bank and the Inter-American Development Bank have granted permission to award tenders through e-Procurement and have come out with detailed document "E-Bidding Requirements for MDB Loans, Grants and Credits" in May 2005.

The Berlin wall crumbled to make Germany one. The Srinagar-Muzzafarabad bus service has brought together either sides of the Line of Control. The world is moving in the direction where the walls are collapsing, allowing all to mingle freely. Similarly all Indian government departments are moving towards sharing data and technologies freely across terrain, beyond all barriers of language and infrastructure. The government, NGOs and the private parties are joining hands together to reap the best of the technological advantages.

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MANAGING AND PROMOTING WORKFORCE DIVERSITY IN EDUCATIONAL ENVIRONMENTS: EVALUATION OF FACULTY PRESENCE AND EQUITY PARTICIPATION

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ABSTRACT

In the wake of diversity initiatives, a number of significant research have been conducted on the management and promotion of diversity at university and college campus, and its impact on productivity, morale, and relationships. Based on universities' commitment to diversifying their faculty, curricula, and student body, this study analyzed the extent of diversity occurring in academic institutions and its impact on minority student retention and drop-out rate. Recent studies on diversity programs were systematically reviewed and analyzed, and this study concludes that academic excellence and student retention start with a diverse faculty and administrators.

Keywords: Workforce diversity, Minority faculty, Higher education Faculty positions, Diverse backgrounds, Knowledge economy, Globalization

INTRODUCTION

The workplace of the twenty-first century, including higher education, is changing rapidly. The kinds of faculty and administrators who occupy senior and high-powered academic positions are diverse. Faculty responsibilities, skills, training, and the tasks they perform in their various departments and universities are changing as a result of demographic differences. The competitive nature of higher education recognizes the need for faculty diversity on campuses. The US News and World Report (2006) noted that academic excellence and increased productivity in the twenty-first institutions should start with a diverse faculty. Studies indicate that many universities in the United States are making serious efforts to appoint a chief diversity officer in an attempt to ensure that there is a diversity of faculty, administrators, and students on their campuses. A recent report by The Chronicle of Higher Education (September 29, 2006) pointed out that Harvard University, Texas A & M University, and the Universities of California at Berkeley, Texas at Austin, and Virginia, among others, have established chief-diversity-officer position in the past two years.

As globalization and multiculturalism trend challenge domestic economies, the need to diversity the workforce becomes increasingly critical and higher education should take this trend serious in order to sustain the interest of their diverse student body. New studies reveal that universities are making serious commitment to diversifying their faculty positions and curricula and the creation of chief diversity officer position is certainly a strategic way university presidents can appease minority students and other stakeholders. The Chronicle of Higher Education (2006) noted that a university president conceded that part of the goal in creating the position of chief diversity officer was to show the campus that the administration was serious about diversifying the presence of faculty and students. According to the Chronicle's analysis, minority professors make up 12 percent of the faculty at Washington State University, and minority students account for 15 percent of enrollment. Therefore, appointing a chief diversity officer is a clear indication to the community that diversity is a high priority at the university campus.

Generally speaking, domestic and global organizations are established to cater to diverse consumer base, and they produce goods and services for their diverse consumers. Therefore, the management of human activities and skills associated with knowledge acquisition, learning and teaching, and the ultimate transformation of resources should include intellectual diversity. This is important for sustainable growth and profitability of businesses and for the retention of students and administrative staff. In their analysis of the importance of workforce diversity, Ferrell, Hirt, and Ferrell (2008) explained that organizations as diverse as Dell Computer, Campbell Soup, UPS, and public hospitals share a number of similarities relating to how they effectively transform resources into goods and services by ensuring and encouraging diversity of staff and opinions. The study concludes that to fully utilize the resources

necessary to create goods and services, it is important to assess the impact of diversity of intellectual capital in achieving the overall goal of organizations and academic institutions.

Furthermore, number of studies (Weaver, 2001; Crosette, 2001; Garvin, 1993) have shown significant correlation between diversity in the workplace and organization growth, especially in higher education where students from different cultural backgrounds are associating with faculty with diverse background. It is also argued that diversity is a critical element for sustainable growth in other forms of business enterprise. For example, Florida and Gates (2001) demonstrated the significance of diversity to high-technology growth. They analyzed the diversity of fifty (50) metropolitan areas and the success of these areas in high-technology growth. Areas were ranked in regard to high-technology using an index developed by Milken Institute, identified as “Tech-Pole.” High scorers on the Milken Tech-Pole rankings were: San Francisco, Boston, Seattle, Washington, D.C., Dallas, and Los Angeles. Areas that scored high on the composite diversity rankings were Los Angeles, San Francisco, Washington, D.C., and Boston. Florida and Gates found the following factors to be correlated with high-technology success: (a) having a large gay population, (b) having a large proportion of bohemian types (artists, musicians, writers, and actors), (c) having a large population of foreign-born individuals, (d) overall diversity. The study then concluded that “people in technology businesses are drawn to places known for diversity of thought and open-mindedness.” Other studies strongly indicate that the standard of living, work performance, and overall productivity in an organization can improve significantly as women and other minority groups enter the labor force and are treated equally and fairly (Crosette, 2001). Suppressing or minimizing the rights of minority groups and keeping them uneducated and systematically out of the workforce affects the performance and growth of organizations. Globally, Edelman (2005) attributes the poverty of many Muslim countries to their failure to invest equitably and substantially in the human capital of the society, especially women and other categorized minorities. This type of marginalization of some members of the society creates an imbalance in the economic structure as well as a sense of insecurity. It is equally counter-productive to place women or any minority group at a competitive disadvantage.

According to a research conducted by Urroz-Korori (2003), women make up 70 percent of the 1.3 billion people living in absolute poverty worldwide. This population lives on less than a dollar per day. While these statistics represent a global assessment, they include an overwhelmingly high percentage of Muslim women.

Country	Per capita (USD) real income	Percent of women at all levels of government	Percent of women in higher education
Canada	38,824	17.7	53
United States	35,184	33.1	56
Japan	22,976	9.3	44
Australia	21,644	22.6	51
European Union (15)	21,104	13.6 ¹⁰	50.8 ¹¹
New Zealand	13,831	26.4	56
Korea	10,813	0.8	37
Czech Republic	5,412	10.6	47
Hungary	5,061	6.9	53
Brazil	5,033	13.7	53
Thailand	2,142	2.1	NA
India	516	5.8	36

Table 1 – Relationship between per capita GNI, women in government, and women in Higher education for non-Islamic countries

However, in the case of the six selected Islamic nations shown in Table 2, the data more clearly supports the thesis linking development to women’s participation in government: as women’s participation in government decreases, so does per capita income.

Country	Per capita (USD) real income	Percent of women at all levels of government	Percent of women in higher education
Malaysia	4,249	8.1	NA
Turkey	2,971	5	38
Tunisia	2,182	7.9	45
Egypt	1,403	4	NA
Indonesia	726	1.9	35
Bangladesh	381	1.9	NA

Table 2 - Relationship between per capita GNI, women in government, and women in higher education for selected non-oil producing Islamic countries

HIGHER EDUCATION IMPROVES THE ABILITY FOR WOMEN TO THRIVE IN DOMESTIC AND GLOBAL ECONOMY

A number of recent articles have examined the critical need of diversity in academic workplace. The Chronicle of Higher Education (July 22, 2005) noted that The University of Michigan at Ann Arbor is one of the many universities now providing grants to female scientists in need of teaching assistance in the lab or classroom. This support system is designed to increase time flexibility for women faculty that allows them to spend more time with their family as well as pursue their academic careers. Further, The Chronicle also reported that Harvard University academic committees have adopted strategic steps to support female faculty. The article stressed that after his controversial statements on female faculty last year, the president of Harvard, Lawrence Summers created two committees aimed at increasing the recruitment and retention of women at the university (Chronicle, May 27, 2005). The absence of diversity of faculty on university campuses has become a national issue, and has even been seen as calculated discrimination against specific groups of people. Discussing the implications of racial imbalance in the work place, including at universities and colleges, Brief (2008) noted that the U.S. Joint Economic Committee estimated the loss of Gross Domestic Product (GDP) in the country at 4 per cent due to racial discrimination and poor representation of minority groups in organizations.

Studies have defined profit and not-profit organizations, including higher education, as comprising of people of different backgrounds and races who oversee the production of goods and services, transformation process, the planning and designing of operations and systems as well as conducting research, teaching, and learning (Weaver, 2001; Anderson, 1993). These studies noted that the level of effectiveness and efficiency achieved in these various types of organizations largely depend on the diversity of human capital. Researchers (Hellriegel & Slocum, 2008; Schermerhorn, Hunt, & Osborn 2008) explained that the twenty-first century workplace is changing rapidly, undergoing monumental shifts in structure, focus, and composition, which requires that businesses and academic institutions should pay close attention to increasing the diversity of their workforce in order to enhance their competitive advantage. Because of the growing population of minority students, universities and colleges are creating new initiatives “from minority to diversity programs” intended to attract minority students and to encourage their retention on their campus. This initiative, according to The Chronicle of Higher Education (February 3, 2006), promotes the hiring of minority faculty.

Based on some studies (Abasi & Hollman 1991; Anderson 2003), the workforce in the United States is expected to continue to undergo a dramatic change in the next decade, with a tremendous impact on productivity. Therefore, businesses aspiring to succeed in the twenty-first century global economy should first recognize the growing trend of diversity and place a strong emphasis on the management of its intellectual capital (human resources) in order to achieve or maintain a competitive advantage in their various industries. While managing service and manufacturing operations are critical elements, organizations are recognizing that their workforce needs to change as their target markets (consumers/customers) are changing. For instance, an organization with a growing Hispanic customer base will have a competitive advantage if its sales representatives and a significant number of its human resources speak Spanish. As the workforce is changing, productivity and profitability will depend on the creative management of workers at all levels of the organization. Similarly, as universities and colleges admit students from different parts of the world with diverse cultural backgrounds, it is critically important that faculty members in these institutions reflect and represent diversity. This diversity representation is important for student retention, quality of teaching, mentoring, and the building of relationships on campuses.

PROBLEM STATEMENTS:

We live in an age of globalization and knowledge economy, business organizations and academic institutions will succeed only to the extent that they are able to embrace and encourage workforce diversity. By ensuring that their workplace is significantly diverse and that minority groups are respected, appreciated, and valued, the learning environments (universities and colleges) will be able to harness the collective knowledge of their faculty and staff. As McGuire (2002) noted, the collective knowledge of organizations, including academic institutions, can be enhanced by including people with different experiences, trainings, and racial/cultural backgrounds. Marketers and marketing consultants agree that critical ideas for new products have been suggested by subcultures. Foods such as tacos, tortillas, pita, kasha, etc. did not originate in mainstream America, but were first popular with sub-cultural groups. The same is true of much of the educational milestones that have become widely known and respected. The higher education environments and business establishments, both for profit and not-for-profit, need new ideas to thrive and the best way to ensure a steady flow of ideas is to hire employees and faculty from diverse backgrounds. Sims (2002) stressed that a homogenous workforce is not likely to come up with creative solutions to facing domestic and global markets, but empathetic marketing is very effective. Firms that hire employees similar to their customers will become more successful, because these employees will be able to identify the special problems faced by their customers and will be able to come up with ideas for new products that best satisfy women, minorities, and the disabled. The U.S. Census Bureau (2001) estimated that Hispanics alone will spend about \$1 trillion a year by 2010.

STATEMENT OF OBJECTIVES

Recent academic literature indicate that America's higher education (colleges and universities) differ in many ways. Some of them are large urban public institutions, while others are independent small rural campuses. Some of these institutions offer graduate and professional programs, and there are those that focus primarily on undergraduate education. As Abbasi, Hollman, 1991; Anderson, 1993) pointed out, the collective diversity among institutions is one of the great strengths of America's higher education system, and has helped make it the best in the world. Preserving and sustaining diversity of students and faculty is critically important if the United States, and indeed, the global society expects to serve the urgent development needs of our democratic world.

Both domestic and global academic institutions share a common philosophy, born of experience, that diversity in their student bodies, faculty, and staff is important in order to fulfill their fundamental educational mission and live up to their objectives of providing equal and quality education. A number of studies (Garvin, 1993; U.S. Census Bureau, 2002; Florida & Gates, 2001) emphasize that diversity in higher education enriches the teaching and learning experience of students and faculty, and creates an academic environment that is conducive to building supportive and life-long relationships. Education within a diverse setting prepares students to become good citizens in an increasingly complex, pluralistic global society, and fosters mutual respect and teamwork.

LITERATURE REVIEW

With the increasing mobility of the workforce in the twenty-first century, higher education is facing a diverse work environment both for faculty and students population. Striving to recruit, effectively manage, and maintain a diverse workforce is an important goal in order to ensure that the right combination of skills and competencies are available at university campuses. As Nelson and Nelson (2005) noted, the second half of the twentieth century witnessed a quite dramatic shift in the nature of white-collar employment from lifetime tenure, often in a very hierarchical work structure to a new model defined by flatter organizations, job insecurity, shorter tenures, declining attachment between employer and employee, and contingent workers. Other studies (Abbasi, 1991; Amott & Mathane, 1991; Workforce Management, 2009) emphasized that managing employment relations has become an issue of huge strategic importance as higher education and businesses struggle to respond to the pace of change in management and administrative systems and working practices.

The significance of maintaining diversity in academic institutions has continued to dominate recent discussions and academic debates. In a recent study in the Chronicle of Higher Education, it was advertised that "Academic excellence and diversity start with a diverse faculty." It was then pointed out that one of the primary reasons minority students flock to San Francisco State University is the diversity of its faculty body, "most remarkably in faculty hiring patterns." Furthermore, the Chronicle explains that "with steady increases in female tenure/tenure-track hires since 1988, women now comprise 52 percent, and minority 43 percent of tenure/tenure-track faculty at San Francisco University." Emphasizing the need for diverse faculty in higher education in order to balance

teaching and learning and to improve faculty-student relationships, *The Chronicle of Higher Education* (September 29, 2006), citing Charles Reed, Chancellor, California State University, acknowledges that “In almost two decades of leadership, President Robert Corrigan has been a national role model in the hiring of a diverse faculty.”

In order to ensure that academic institutions in the United States are adequately diverse in the hiring, placing, and promoting of faculty members, a new senior administrative position titled the “chief diversity officer” has been created. The creation of this senior academic position has been widely commended as it sees to the placement of faculty members of different backgrounds that bring perspectives, skills, and competencies that complement the missions of academic establishments. For example, Purdue University prides itself in the power of diversity faculty and staff. According to *The Chronicle of Higher Education*, since adopting its strategic goals for diversity in 2001, Purdue University has filled 643 tenure-track positions that reflect faculty members from different backgrounds. Fifty-eight percent of these professors come from under-represented groups or women, including 32 percent minorities. The university strongly believes that the retention of diverse faculty is vital to the advancement of the institution. Indeed, it was stated that in the past five years, the promotion and tenure success rate for minority faculty at Purdue University was 91 percent (*Chronicle of Higher Education*, 2006).

Furthermore, in its analysis of “New Tenure/Tenure-Track Hires for 1989-2006” at San Francisco State University,” the *U.S. News and World Report* (2006) stated that 27.6% was white male, 72.4% was minority/female, 47.4% represented male, 52.6% female, 56.5% was White male, and 43.5% was minority. Citing Mr. Rawlins, *The Chronicle of Higher Education*, stated that at Washington State, a land-grant institution of about 19,000 students, minority professors make up 12 percent of the faculty and minority students account for 15 percent of enrollment, stressing that the creation of chief diversity officer ‘is a clear statement to the community that diversity is a high priority’ in academic institutions, especially in higher education environment.

Some studies (Abasi & Hollman 1991; Anderson 2003) predicted that the workforce in the United States will undergo a dramatic change in the next decade, with a tremendous impact on productivity. Therefore, businesses aspiring to succeed in the twenty-first century global economy should place more emphasis on the management of its intellectual capital (human resources) in order to achieve or maintain a competitive advantage in their various industries. While managing service and manufacturing operations are critical elements, organizations are recognizing that their workforce needs to change as their target markets (consumers/customers) are changing. For instance, an organization with a growing Hispanic customer base will have a competitive advantage if it sales representatives and a significant number of its human resources speak Spanish. As the workforce is changing, productivity and profitability will depend on the creative management of workers at all levels of the organization.

FINDINGS

As stated before, a homogenous workforce is not likely to come up with creative solutions facing domestic and global markets, figure 1 below depicts such environment dominated by one culture or a particular race.

Figure 1: Nationwide Full Time Faculty Members By Ranks and Race

The data used to plot the above chart was taken from: The Chronicle of Higher Education, Almanac Issue 2008 – 2009. As we can see from the chart, it is evident that almost all the races and ethnic groups are represented in the number of full time faculty members nationwide. Ironically, the white group overly dominates every race in all ranks of the faculty which illustrates the fact that in a college or university where this is evident there will be lack of student retention of majority of non-white students. The culture in such environment is not diverse.

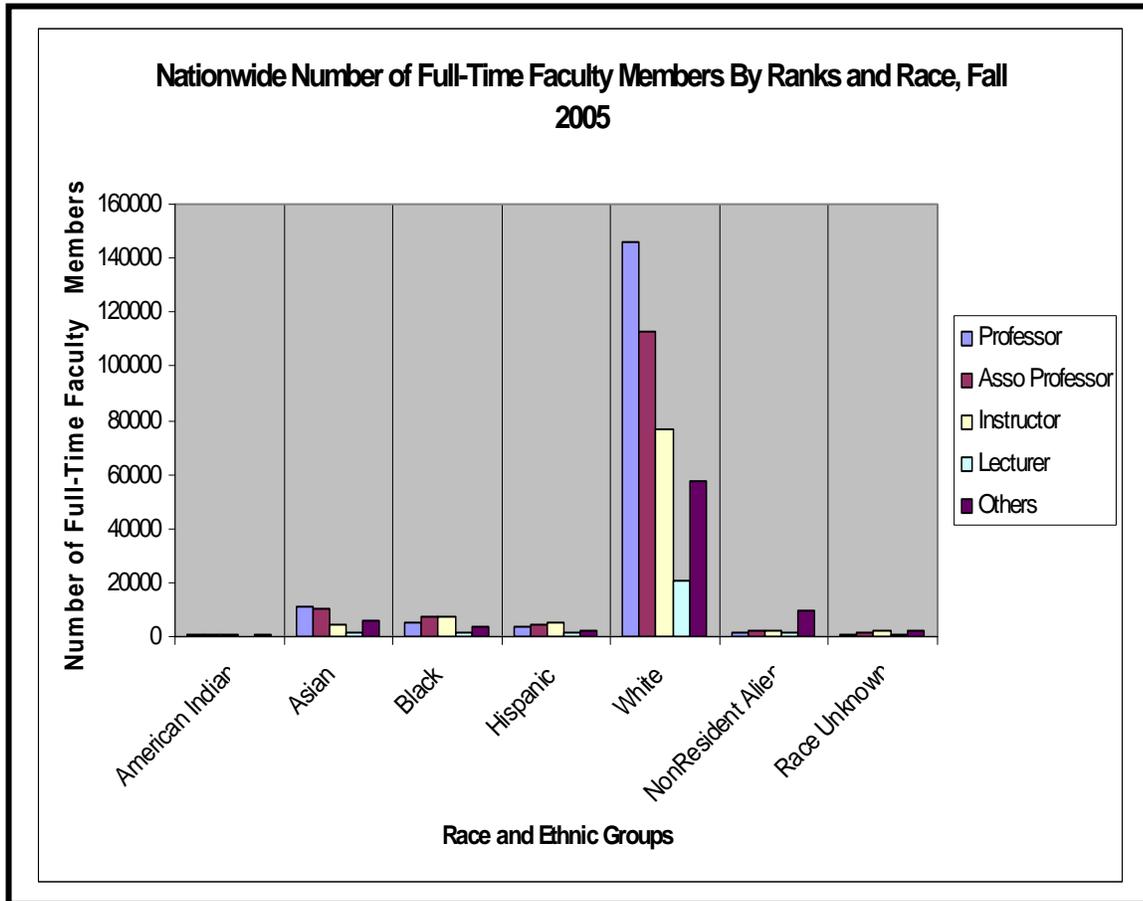


Figure 2 below illustrates a disproportionate representation of men and women university employees in the United States. The data in tables 1 and 2 links development and higher education to women’s participation in government. As women’s participation in government decreases, so does per capita income. This is to say that, any community that minimizes the rights of minority groups and keeping them uneducated and eventually out of workforce affects the performance and educational growth of that community or organization.

Table 3 below shows the percentages of the United States’ populations and the colleges/universities faculty members employed in Fall 2005. This data was also obtained from The Chronicle of Higher Education (August 29, 2008), Almanac Issue of 2008 – 2009.

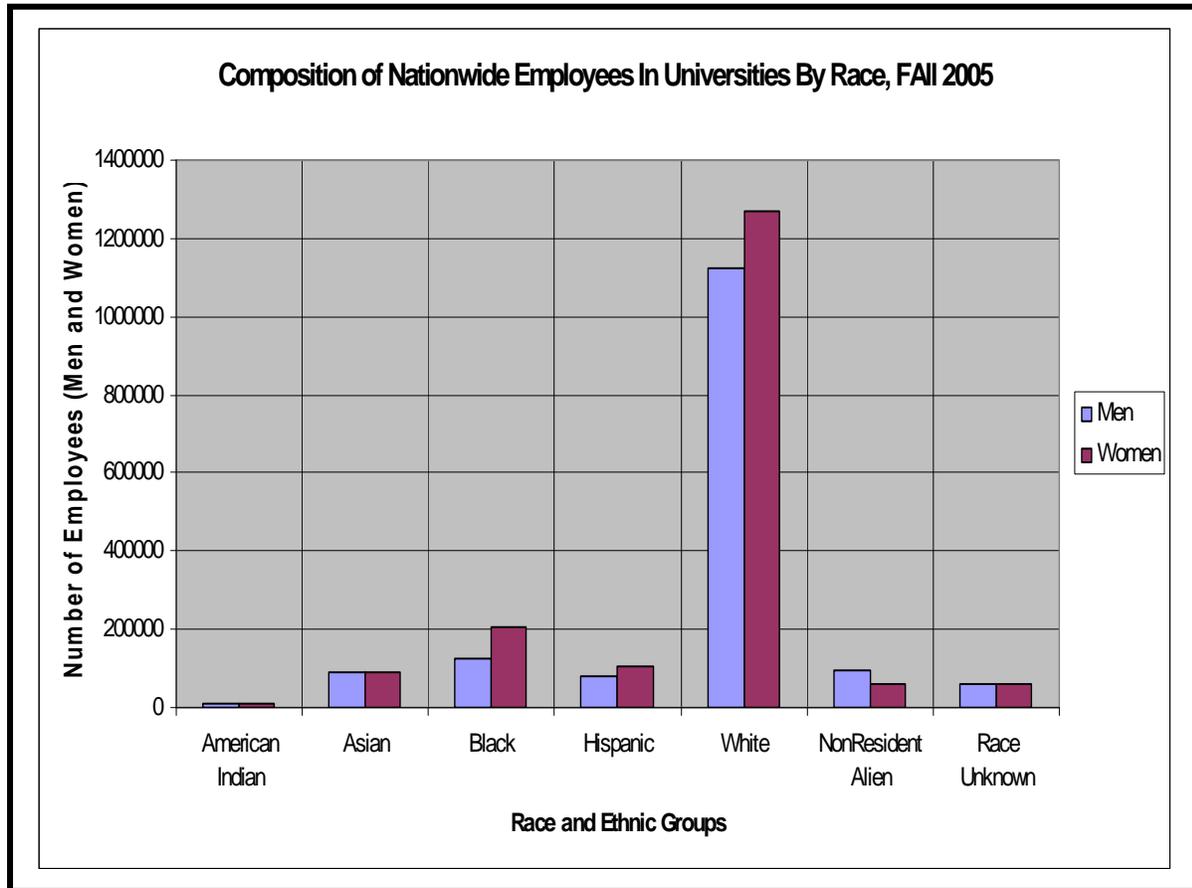


Figure 2: Nationwide Men and Women University Employees By Race

Percentages of Nationwide Employees By Race, Fall 2005			
	Population	Faculty Members	
American Indian	1.0	1.7	
Asian	4.4	2.6	
Black	12.8	5.2	
Hispanic	15.1	12.0	
White	65.0	78.1	
NonResident Alien		4.2	
Race Unknown		1.4	

Table 3 – The Percentages of the U.S Populations and Faculty Members by Race

As we can see from the above table, the percentage population of the White race in 2005 was 65% while that of Black American was 12.8%. But, the faculty members employed in that same year among the White group was 78.1% which by far exceeded their racial quota if diversity in the colleges and universities are to be maintained proportionately to enhance learning and student retention. The faculty members employed in other races or the minorities especially among the Black American are very much under represented. Could this mean the main attribute to the higher rate of college or university dropout among the Black community than it is among the White group? The chart below (in the next page) shows the graphical representation of the data in table 3 above. The White Faculty members in the colleges and universities in 2005 overshadow other races. This means that the collective knowledge needed to harness learning in a diverse

environment is lacking among the minorities that are represented in this data.

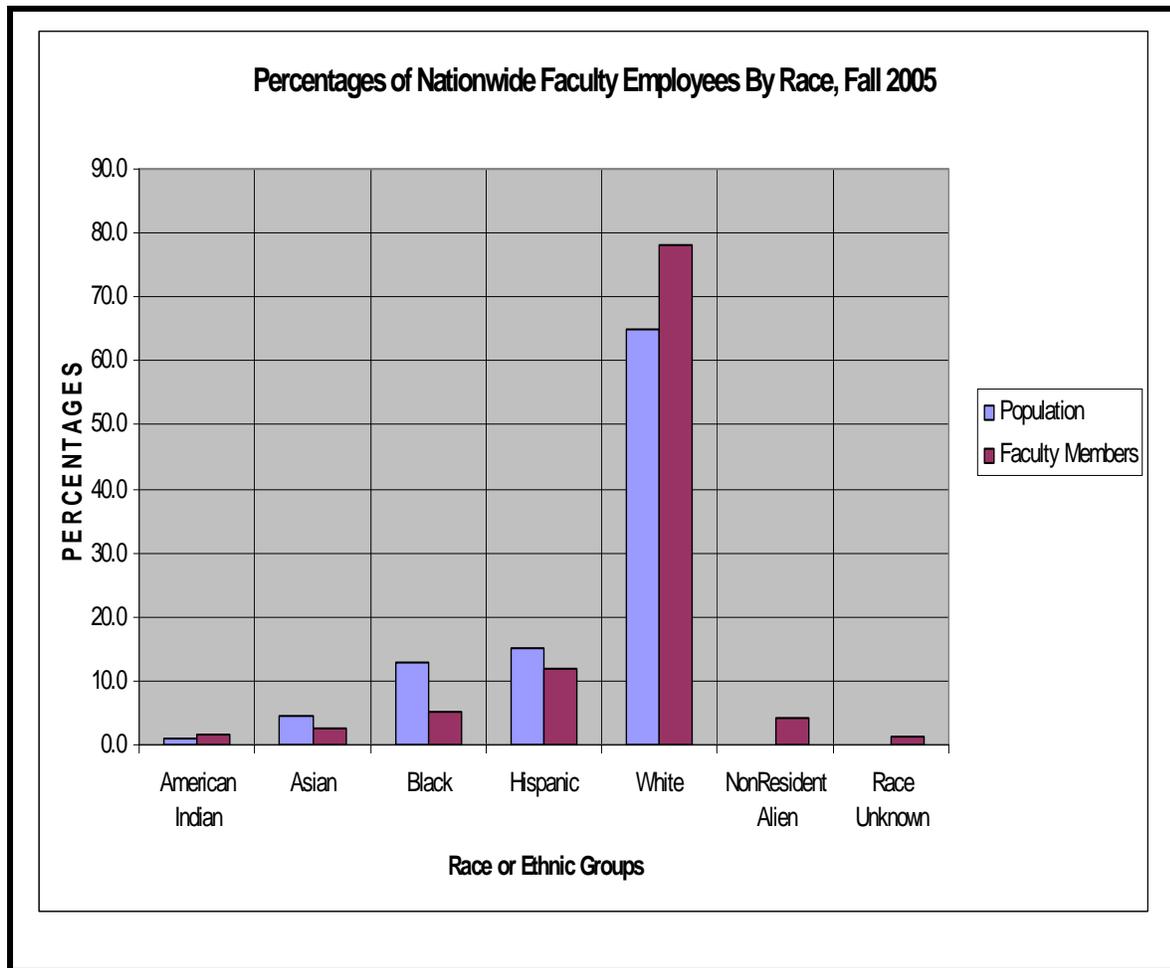


Figure 3: Percentages of U.S Population and Faculty Members By Race

According to Stephen D. Krashen’s article “The Dropout Argument”, 8.6% White dropped out of school while 12.1% Black dropped out. This is a large number of Black students dropping out of schools comparing their population with that of the White community. The worse case scenario is that of the Hispanic group. We can therefore ascertain that the training and different cultural backgrounds needed among the faculty and staff in these higher institutions to retain the minority students are lacking.

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TARGETING TOMORROW'S CONSUMERS: IMPLICATIONS FOR TODAY'S BUSINESSES

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ABSTRACT

A survey of 1050 rural US high school students revealed their favorite Internet sites, how many hours per week were spent on the Internet, and the time of the day the Internet was viewed. In addition, this study found the items most commonly purchased on the Internet, where the Internet was accessed and how the students respond to banner advertisements. Suggestions for marketers to reach this segment are also discussed.

INTRODUCTION

Businesses devote considerable effort, time, and funds to attract new customers. They are constantly developing and refining products to appeal to specific niches. Certainly that strategy works, but there is a large mass of new customers, the Millennials, which can be targeted as well (Strauss & Howe, 1991). Perhaps the most effective way to reach this group is while they are still in high school. They are young, impressionable and often work to earn money which they spend on themselves.

These Millennials are a sizable customer demographic. Depending on the dates used to mark its inception, its members total between 30 million and 80 million future customers. These students are immersed in technology and curiously, have a positive view of advertising. This group has more disposable income than one would think as 40% of teens 14 to 19 years of age earn an average of \$100 a week (Marlatt, 1999). It is estimated that teens spent \$170 billion in 2003 (Paul, 2003). These expenditures rose to \$191.5 billion by 2006. From 2001 to 2006 spending has increased 27.7%. Further, according to the International Council of Shopping Centers, the average teen visits retail stores 54 times a year. Nearly 60% of parents report spending more when teens accompany them shopping (Teens/Tweens, 2005). In many one-parent homes, teens have substantial influence over household purchases but overall teens spent \$150 billion in 1998 and influenced \$450 billion in purchases (Marlatt, 1999). With this Millennial population growing the influence over household shopping is likely to continue. Interestingly, 37% of female Freshmen and Sophomores paid attention to e-mail ads as did 24% of Junior and Senior females (Paul, 2003).

With access to this buying power, it would benefit business to learn what sites teens visit, when, how often, and the type of advertising strategy that appeals to them.

PURPOSE

The purpose of this paper is to determine the online viewing habits of one demographic segment, high school students, to devise ways for marketers and businesses to target this growing customer base.

METHOD

An anonymous survey was distributed to high schools in a mid density county in an eastern U.S. state. A total of 1050 usable responses were obtained. Data was collected for a number of demographic and control variables chosen to describe Internet usage and purchasing patterns by various groups. A copy of the survey is included in Appendix A. Major questions addressed in the survey include:

1. What are most viewed Internet sites of high school students?
2. How many hours per week do High School Students spend on the Internet?
3. How often do high students visit their favorite sites and does it vary by the time of day?
4. What do high school students purchase over the Internet?
5. Where do high school students use the Internet?

6. How do high school students react to banner ads?

LITERATURE REVIEW

There have been a number of studies to ascertain what web sites various age groups tend to view. Those studies pertaining to high school students are in the minority and often overlap with teens in general and include middle school students as well as high school students. It is readily seen that teens used the Internet for a variety of activities. Kerner (2005) reported 84% of teens visited entertainment websites and 81% played online games, while only 55% reported to look at news sites. In addition, over 40% of those surveyed reported shopping online while 26% used the Internet for information or spiritual advice. Kaiser (2005) found students ranging from 8 to 18 years of age were playing games 32% of the time, instant messaging for 28%, visiting other websites 23%, e-mailing 8% and chatting and other for the remaining 8%. Moskalyuk (2005) surveyed teenagers between 13 to 17 years of age and found 20% of the teens used such sites as Lyrics.com, 22% used Limewire, 24% used Quizyourfriends.com, 29% used Freetranslation.com and 23% used Sparknotes.com. Other research found 78% of teens were using e-mail while online at least once a week, 72% were chatting with friends at least once a week, 45% were using the Internet to download music at least once a week, and 39% of teens were online playing games (Alloy, 2007).

Instant messaging is a popular form of communication for 65% of all teens (Weiss, 2008). Gonsalves (2005) reported three-fourths of the current generations of teens are opting to use instant messenger in place of e-mail with males and females instant messaging the same amount of time (Lloyd, 2006). Chiara (2008) found that aside from instant messaging one of the most popular sites visited by teens was MTV.com, with boys more likely to be searching for sports and music. In addition 80% of teens used the Internet as a source for news or to play games (Gonzales, 2005). Loughlin (2007) found that while 69% of boys between the ages of 12 and 14 used the Internet to play online games, only 45% of girls are using the same sites.

According to the United States Census Bureau (2003), 58 % of 15-17 year olds were using the Internet for email, 55% played games, and 68% completed school assignments using the Internet. A 2005 Pew Internet Study by Lenhart, et al, found online games were played by 81% of those teens that had Internet access. In addition, 76% used the Internet for news, and 43% shopped online. Also, 57% of these teens researched information on colleges and 30% looked up information about jobs.

For today's teens, social networking sites are a top pick among websites. These sites allow teens to stay in touch with their friends and make new friends. Over three fourths of American teens reported using social networking sites ranging from sometimes to frequently (Symantec, 2008). From a survey conducted by Pew Internet and American Life project, Lenhart and Madden (2007) found over half (55%) of teens ages 12-17 built profiles on social networking websites. However this statistic increased with age as 70% of older girls and 54% of boys had profiles. Over 60% of teen web users visited sites like MySpace, and a majority joined such sites (Davis, 2006). Nielson (2007) stated "Teens tend to spend, on average, significantly more time on MySpace than Facebook" and noted the growth rate among teens visiting Facebook increased 122% from 2006 to 2007.

A survey by Internet Retailer (2006) found 87% of teens nearing 18 years of age went shopping online weekly. Gonsalves (2005) reported 90% of teens were Internet users with a total of 20 million teens visiting the web on a daily basis. In a 2007 study by WSL Marketing Inc, teenagers were spending an average of 18 hours online a week. Of those, nearly 30% were online for over 20 hours a week while 16% being online between 11-15 hours a week and another 16% online 16-20 a hours a week. Just over 40% limited their Internet usage to less than 11 hours a week (WSL, 2007).

Using the Internet takes time away from other pursuits. Freeman (2000) notes that teens were reading less newspapers (-11%), magazines (-13%), and listening to the radio less (-9%). Gross (2004) notes adolescent Internet usage skyrocketed during the last ten years and the expectations of males spending more time online than females, and the assumption that the Internet causes social isolation were contrary to the facts.

Weiss (2008) broke Internet usage down by grade level finding that the lowest percentage of use was 9th graders (at 87%) with higher levels of usage in the upper grade levels: 90% of Sophomores and 94% for both Juniors and Seniors. Daily Internet usage is high with Weiss (2008) reporting that 51% percent of teens were using the Internet daily and Loughin (2007) reported that 69% of teens have been found to be going online daily.

PERC (2005) found that not only do teens spend more time on the Internet now than they do sitting in front of a television but they are becoming more tech-savvy as 24% of them have actually created their own Web Page.

With the variety of news, information and entertainment, it not surprising the Internet has become another channel for marketers. Shepherdson (2000) noted that magazine publishers set up web sites to extend the reach of their periodicals. Similarly, the food and beverage industry are using the Internet to target customers (Story & French, 2004). In fact, the Internet has become an indispensable medium, and has joined with TV and print media to influence adolescent buying habits on pressuring of family purchases (Roberts and Foehr, 2008). In 1999, nearly 7.4 million Americans over the age of 16 made a sport-related purchase over the Internet in the previous year. Sport marketers hope to capitalize on this huge untapped group (Grish, 1999).

Internet shopping habits are an important aspect of research today. High school students are a growing part of today's market and thus their shopping habits have the potential to affect what is offered for sale. Stringer (2001) noted that teens enjoyed the first hand shopping experience as much as the actual buying. They enjoyed the interaction and community of hanging out in malls and watching the crowds and only spent four hours each month on the Internet. He encouraged web retailers to compete with the entertainment and excitement of the mall since only 11% of teens made online purchases. However, 30% of teens did window-shopping in cyberspace.

According to WSL Marketing Inc (2007), teens spent approximately five and a half hours a week just browsing the Internet for things to buy. WSL found teens were buying significantly more than adults in categories such as beauty and hair products. The study found 22% of teenagers were making at least one online purchase a month (WSL, 2007). As their Internet usage increased so too did their Internet shopping spending. In fact, Weiss (2008) found teen Internet shopping rose from 31% in 2000, to 43% in 2008. Knight (2007) reported 65% of teens used the Internet to do their shopping research. They find out about the product, and then purchase it in person.

Earlier in the decade, Grasse (2000) found 82% of Americans ages 13-18, were using the Internet at home, school or both. According to a study by Pew Internet only 13% of teenagers did not have access to the Internet. This study found those not online were confined by lower income levels and were more likely to be African-American (Lenhart, 2005). The study also found the most popular place for teens to use the Internet was at home. The majority of these teens used their computer in a family room while 25% had a computer in their bedroom. Internet access is widening and midway through the decade research was showing that over half, 54%, of teens surveyed used the Internet at a public library and nearly the majority 78% used the Internet at school. Only 17% of the respondent said that school was their primary location for Internet use (Lenhart, et al, 2005).

In a survey by Neilson/Net Ratings, teenagers were found to be the age group least likely to click on banner ads. "The average click rate for the 12-17 year old group was 19% in June 2000" (Business Wire, 2000).

RESULTS AND DISCUSSION

The original survey was filled out in local high schools and resulted in 1572 surveys being returned. Of those surveys a number were incomplete or the respondent had filled out responses that were contradictory with later responses (e.g. a respondent indicating that they made no Internet purchases but then listed an amount of purchase or an item purchased). These were discarded as not usable resulting in 1050 complete and usable surveys. The demographic characteristics of the remaining sample are described in Table 1.

Females slightly outnumbered males but age breakdowns measured by high school grade were similar. A high percentage felt they were going to college.

Table 1*Demographic Characteristics of the Respondents*

Gender		College Bound	
Female	53%	Yes	90%
Male	47%	No	10%
Class		Employed	
Freshman	27%	No	76%
Sophomore	26%	0-10 hrs/wk	7%
Junior	25%	11-20 hrs/wk	11%
Senior	22%	21-35 hrs/wk	4%
		> 35 hrs/wk	1%
<u>Ethnicity</u>			
	87%		
<u>Caucasian</u>			
<u>Non-Caucasian</u>	13%		

1. What are most viewed Internet sites of high school students?

The four most viewed websites were MySpace/Facebook, Music, Games, and Chat (see Table 2). This may be indicative of the primary use of the Internet as a social and entertainment vehicle and not as an informational or education medium. Shopping is in the middle of the pack of sites visited.

Table 2*Favorite Internet Sites Viewed*

<u>Site</u>	<u>%</u>
MySpace/Facebook	76%
Music	60%
Games	44%
Chat	43%
Entertainment	35%
Shopping	26%
Sports	25%
Weather	21%
News	12%
Reference	6%
Travel	4%
Gambling	3%
Employment	3%

Examining the sites viewed by gender revealed some differences. MySpace/Facebook as the most popular destination was visited by a greater percentage of females (59%) than males (41%). Music sites were the next most visited, followed closely by gaming, and chatting. Females preferred chatting (53% to 47%) while males preferred games (55% to 45%). The two greatest differences in viewing by gender were found in sports and shopping (see Table 3).

Table 3*Favorite Sites by Gender*

Sites	Female	Male
MySpace	59%	41%
Music	57%	43%
Games	45%	55%
Chat	53%	47%
Entertainment	49%	51%
Shopping	74%	26%
Sports	27%	73%
Weather	54%	46%
News	47%	53%
Reference	52%	48%

Note: travel, gambling and employment sites were eliminated due to low visitation

Kerner (2005) found entertainment websites the most popular website among teens. The difference between those results and the current findings of social networking being most popular can be attributed to the more recent craze in Facebook as it only recently became available to non-college students.

When looking at the favorite sites by the students' grade level, it was found that freshman used chat, games, music and sports more than seniors, while seniors visited reference and news sites the most. In addition, chat websites were most popular with freshman. Gaming websites saw a steady decrease of respondents as age went up as did sports websites (see Table 4).

Table 4*Favorite Sites by Grade Level*

Favorite Sites	Freshman	Sophomore	Junior	Senior
MySpace	26%	27%	25%	22%
Music	28%	25%	25%	21%
Games	31%	27%	24%	18%
Chat	31%	27%	22%	20%
Entertainment	27%	26%	24%	22%
Shopping	27%	30%	22%	20%
Sports	29%	26%	24%	22%
Weather	20%	25%	30%	25%
News	22%	20%	25%	33%
Reference	24%	12%	24%	39%

2. How many hours per week do High School Students spend on the Internet?

The largest percentage of high school students spent between 1-5 hours on the Internet. The percentages of higher-level online usage steadily decreased. However, the survey revealed a larger group of very high online users in the over 25 hours per week range (see Table 5).

Table 5

Weekly Internet Usage by Range

Range	%
1-5 hrs	35%
6-10 hrs	21%
11-15 hrs	15%
16-20 hrs	8%
21-25 hrs	5%
Over 25 hrs	16%

3. How often do high school students visit their favorite sites and does it vary by the time of day

Nearly 70% of teens are visiting their favorite websites at least daily (see Table 6). The overwhelming number of students viewed the Internet in the evening with the smallest amount utilizing it in the morning (see Table 7).

Table 6

How Often Sites are Visited

Category

More than once a day
Daily
2-4 /wk
Weekly

Table 7

Time of Day the Internet was Viewed

Time	%
Morning	16
Afternoon	35
Evening	88
Late Night	29

4. What do high school students purchase over the Internet?

Half of the respondents purchased Clothing over the Internet, followed by Music and Accessories. Interestingly, nearly one third of the respondents purchased shoes on-line (see Table 8).

Table 8*Items purchased over the Internet*

Items	%
Clothing	50%
Music	41%
Accessories	33%
Shoes	31%
Electronics	26%
Sporting Goods	24%
Games	23%
Books	14%
Video	12%
Cosmetics	9%
Travel	8%
Appliances	6%

5. Where do high school students use the Internet?

Nearly all high school students reported they had access to the Internet at home. This implies access to the Internet is nearly universal and is now a household necessity. The next most popular option was the use of Internet at the library while the least popular response was using the Internet at work. These results parallel Weiss's (2008) who found 87% of teens used the Internet at home and 54% get online at a public library (not counting the library at school) for which he found 78% using the Internet (see Table 9).

Table 9

Where do Students Use the Internet

Home	96%
Work	6%
School/Library	42%

6. How do high school students react to banner ads?

Most of high school students ignore Internet banner advertisements while 13% occasionally view banner ads and only 2% often view banner ads (see Table 10). However, these percentages drastically change based on the web site being viewed. Even though MySpace/Facebook were the most viewed sites, these students were the most apt to totally ignore the advertisements. This finding is a caution to marketers who feel they can reach these students via banner ads on MySpace. Interestingly one quarter of the students view banner ads on News sites and Reference sites. This finding may prove beneficial for several reasons. First, the viewers are more prone to view the ad. Second, these viewers tend to be Seniors who most probably are working more and consequently earning more which they are able to spend (see Table 11).

Table 10*Frequency of Viewing Banner Ads*

<u>Category</u>	<u>%</u>
Ignore Them	85%
Occasionally View	13%
Often View	2%

Table 11*Banner Ad Viewing by Site*

<u>Favorite Sites</u>	<u>Ignore</u>	<u>Occasionally View</u>	<u>Often View</u>
MySpace	85%	13%	2%
Music	82%	16%	3%
Games	79%	18%	3%
Chat	82%	16%	3%
Entertainment	78%	18%	4%
Shopping	80%	16%	4%
Sports	83%	13%	4%
Weather	81%	15%	4%
News	75%	18%	7%
Reference	73%	20%	8%

DISCUSSION AND IMPLICATIONS

The results of this study provide many possibilities for businesses to reach high school students. Home Internet accessibility is nearly universal for today's high school students. An amazing 70% of these future consumers faithfully viewed their favorite sites on a daily basis. As a new cultural phenomenon, students are attracted to social networking sites such MySpace/Facebook, and Chat sites. These are new avenues where business should advertise to better reach this population. However, this study has shown Banner ads do not work here since they are overwhelmingly ignored.

Maybe to reach these customers more interactive advertisements or tie-ins with movie, music or TV shows should be used to grab their attention and promote various products and services. Further, business could make use of online coupons. This enticement could be accomplished at a minimal cost but would allow businesses to track their return from this medium. In addition businesses should consider building or hosting a Myspace or Facebook page. They could then be added to "friends" lists, hold contests to engage these customers that could build product knowledge and promote brand loyalty via viral marketing.

The conventional wisdom of males being more interested in sports and females in shopping was verified and could be an avenue for reaching these customers. For example, 81% of visitors to shopping sites purchased clothing. Therefore, special offers, coupons or incentives on shopping websites could increase clothing sales. Similarly, firms such as Nike, Rawlings, Adidas, Reebok, etc. should advertise their products on ESPN, NFL, NBA and MLB sites since 57% of viewers purchased sporting goods (see Table 11). Reference sites were more apt to sell books. Interestingly, those who viewed News and Weather sites purchased electronics.

Table 12
Percentage of Site Visitors who purchased items

<u>Site visited</u>	<u>Clothing</u>	<u>Music</u>	<u>Accessories</u>	<u>Shoes</u>	<u>Electronics</u>	<u>Sports</u>	<u>Games</u>	<u>Books</u>	<u>Video</u>	<u>Cosmetics</u>	<u>Travel</u>	<u>Appliances</u>
My Space	55	43	34	35	27	25	22	14	13	10	8	6
Music	56	53	38	36	31	25	27	19	16	10	8	7
Games	52	50	36	34	34	26	38	19	20	10	7	9
Chat	53	48	39	36	32	29	28	18	17	12	9	9
Entertainment	54	50	40	34	37	26	32	20	20	13	10	10
Shopping	81	60	53	47	39	26	27	24	19	21	14	10
Sports	53	45	37	41	33	57	33	13	16	9	10	11
Weather	56	50	42	41	41	29	33	21	19	15	14	14
News	58	50	42	38	43	29	29	39	27	17	17	14
Reference	53	56	42	35	36	24	33	50	24	20	15	17

With 88% of the students using the Internet in the evening (between 5 p.m. and 11 p.m.), this demographic is not being reached by TV and radio commercials running at those times. Therefore, time based Internet advertising or simulcasts of concerts or sporting events at this time could provide access to these students. This knowledge could enable marketers to target this niche.

FUTURE RESEARCH

Additional research could focus on the amount of money high school students spend on the Internet. Further, students could be surveyed to determine what type of goods they purchase online, the average monthly purchase and the amount they spend by month or year. Comparisons of student viewing and buying habits could be done by gender, race, and class in high school. Other studies could focus on college students and working adults to compare the viewing and buying habits of each group. Finally, the results of this study could be compared with high school and college students from different countries.

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Appendix A

What is your Gender?

- Female
- Male

What is your Race?

- African American
- Asian
- Caucasian
- Hispanic
- Middle-Eastern
- Native American
- Other

What is your Age?

- <20
- 20-24
- 25-30
- 31-50
- >50

Level of Education

- High School
- College (enrolled or completed)
- Graduate Degree (enrolled or completed)

What is/was your Major?

- Business
- Education
- Fine Arts
- General Studies
- Natural Sciences
- Physical Education
- Social Sciences
- Not Applicable

If Business, what concentration?

- Accounting
- Economics
- Entrepreneurship
- Finance
- Human Resources
- Management
- Marketing
- Other

Are you Employed?

- No
- Yes, less than 10 hours/wk
- Yes, 11-20 hours/week
- Yes, 21-35 hours/week
- Yes > 35 hours/ week

Where do you work?

- Not applicable
- Private
- Public
- Entrepreneur business

Is your primary residence?

- Rural < 5000 people
- Small City 5,000-20,000 people
- Medium City 20,000-50,000
- Large City 50,000-100,000
- Very Large City > 100,000

What is your annual income?

- < \$10,000
- \$10,000 - \$20,000
- \$20,000 - \$30,000
- \$30,000 - \$40,000
- \$40,000 - \$50,000
- > \$50,000

Weekly Internet Usage?

- 0 hours per week
- 1-5 hours per week
- 6-10 hours per week
- 11-15 hours per week
- 16-20 hours per week
- 21-25 hours per week
- > 25 hours per week

When do you use the Internet?

- Morning 6 am- 11 am
- Afternoon 11 am- 5 pm
- Evening 5 p.m. to 11 p.m.
- Late Night 11 pm - 6 am

How often do you visit your sites?

- > Once a day
- Daily
- 2-4 times a week
- Weekly

What are your Favorite Sites?

Please check all that apply

- Chat
- Employment
- Entertainment
- Gambling
- Games
- Music
- MySpace/Facebook
- News
- Reference
- Shopping
- Sports
- Travel
- Weather

How do you react to Banner Ads?

- Always Ignore them
- Occasionally view them
- Often view them

What do you purchase on-line?

Please check all that apply

- Accessories
- Appliances
- Books
- Clothing
- Cosmetics
- Electronics
- Furniture
- Games
- Housewares
- Music
- Shoes
- Sporting Goods
- Travel (hotels, airfare, etc)
- Video

Why do you purchase online?

Please check all that apply

- Lower cost
- Can shop at anytime
- Lack of items locally
- Higher cost but like convenience
- Recommended sites by peers

Number of monthly purchases?

- 0
- 1-3
- 4-6
- 7-10
- > 10

Average value of EACH purchase

- \$0
- \$1-\$20
- \$21-\$40
- \$41-\$60
- \$61-\$80
- \$81-\$100
- >\$100

Avg internet purchase/ MONTH

- \$0
- < \$20 per month
- \$20-\$50 per month
- \$51- \$100 per month
- \$101- \$200 per month
- \$201-\$300 per month
- \$301- \$400 per month
- \$401-\$500 per month
- > \$500 per month

Where do you use the Internet?

Please check all that apply

- Home
- Work
- School/ Library

The Role of Higher Education Institutions for Economic Development in Africa: The North-South Dialogue

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ABSTRACT

Higher education institutions have an important role in the development and continued growth of any country, whether developed or developing. In Africa, their role is very critical. Because the population is mostly uneducated, it is the role of higher education institutions, especially universities, not only to educate but to also determine the direction that education should take. The educational system must be designed to stimulate, support and work in tandem with national development. Development is a process in which an educated and skilled workforce is a prerequisite for the creation of jobs. On the other hand national development planners want to know what kinds of skills to develop for those who would want to hire workers.

INTRODUCTION

Recent headlines in the developed countries are touting Africa as the next investment frontier. CNBC proclaimed Africa “the last investment frontier.” “There are dollars: Africa is home to more gold, cobalt and diamonds than anywhere else in the world and sells more oil to America and China than the Middle East. (www.cnbc.com/id/15837362, July 14, 2009) Riba Capital echoed CNBC’s observation in “Dollars and Change: Africa the final Investing Frontier” (Riva Capital, June 15, 2009)

John H. Christy, in a *Forbes Magazine* commentary headlined “Africa: The Last Investment Frontier”, noted that “capital markets are the lifeblood of economic development. Without deep, liquid markets, it’s hard for any country or region-----developed or emerging-----to reach its full potential. In 1989, there were just five sub-Saharan stock exchanges; now there are 16. Granted, these are still immature markets in many respects. Stock-market capitalization as a percentage of GDP is less than 30% in sub-Saharan Africa. The comparable figure for Brazil is nearly 70%.” (p.1)

Africa Open for Business, a documentary produced by Carol Pineau was the main feature at the Atlanta premier of “Africa Investment Horizons” (AIH). The event was hosted by the Nigerian Business Forum (NBF). The documentary shows that Africa may be the next untapped destination. It exhorts investors in America to head for Africa.

While it is gratifying to note that the developed world is beginning to pay attention to Africa, it is also notable that the interest is not in Africa’s natural resources or in the skills and capabilities of its people. This is largely because its people are not productive. They lack the education and the necessary skills to capitalize on the continent’s resources. It is not surprising, therefore, that the current interest in the continent is focused on its rudimentary financial markets.

In the context of traditional development theory, societies or nations develop progressively along a 3-stage continuum—from agrarian through manufacturing to service economies. (Rostow, 1960) Most African countries still export basic raw materials. Items such as gold, diamonds, iron, ore, bauxite, copper and other minerals are exported with minimal or no processing. The second stage of development, the processing of basic raw materials into finished or semi-finished goods has not been developed across the African continent. The resulting educated and skilled labor pool created is more productive and, therefore will earn higher incomes. Liming & Drew (2008) point to a direct link between educational attainments, increased incomes and lower rates of unemployment. The third stage is the development of a service sector that eclipses the manufacturing sector. The service sector requires even higher levels of education and skill than the manufacturing sector. This pattern of development can be clearly seen in developed countries like the United States, Britain, France, Japan and Germany. The pattern can also be discerned in countries like China and India that are shifting from agrarian economics to manufacturing economies.

PATTERN OF AFRICAN DEVELOPMENT

Table 1 show that Africa’s labor force is concentrated mainly in the agricultural sector. Twenty-two of the 43 countries on the list have agricultural labor of 70 percent or more. Twenty-seven

have 60 percent or more. Only four of the 43 countries have an industrial labor force of more than 20 percent. The highest is 36 percent. In the service sector, nineteen of the countries have more of their labor force in the service sector than in the manufacturing sector with the highest at 54 percent (Libya, Mauritius), Egypt at 51 percent and South Africa at 45 percent.

Figure 1 show a comparison of the distribution of the labor force by sectors for African countries and OECD countries.

Table 1

DISTRIBUTION OF WORKFORCE BY SECTOR FOR AFRICAN COUNTRIES			
COUNTRY	AGRIC%	INDUSTRY%	
ANGOLA	85	NA	NA
BENIN	NA	NA	NA
BOTSWANA	04	NA	NA
BURKINA FASO	90	NA	NA
BURUNDI	94	2	4
CAMEROON	70	13	17
CENTRAL AFRICA REP	NA	NA	NA
CHAD	80	NA	NA
CONGO, DEM	NA	NA	NA
CONGO, REP	NA	NA	NA
COTE D'IVOIRE	68	NA	NA
EGYPT	32	17	51
EQUATORIAL GUINEA	NA	NA	NA
ETHIOPIA	80	08	12
GABON	60	15	25
GAMBIA	75	19	06
GHANA	60	15	25
GUINEA	80	10	10
GUINEA-BISSAU	82	NA	NA
KENYA	75	NA	NA
LIBERIA	70	08	22
LIBYA	17	29	54
MADAGASCAR	NA	NA	NA
MALAWI	90	NA	NA
MALI	80	NA	NA
MAURITANIA	50	10	40
MAURITIUS	14	36	54
MOZAMBIQUE	81	06	13
NAMIBIA	47	20	33
NIGER	90	06	04
NIGERIA	70	10	20
RWANDA	90	NA	NA
SENEGAL	NA	NA	NA
SIERRA LEONE	NA	NA	NA
SOMALIA	71	NA	NA
SOUTH AFRICA	30	25	45
SUDAN	80	07	13
SWAZILAND	NA	NA	NA
TANZANIA	80	NA	NA
TOGO	65	05	30
UGANDA	82	05	13

ZAMBIA	85	06	09
ZIMBABWE	66	10	24

THE STATE OF AFRICAN EDUCATION

While it can be argued that African governments are beginning to realize the importance of education, it is debatable, however, as to whether they see it as an imperative for economic development. According to a UNESCO report (2009), a child in Africa can expect to receive, on average, 4.5 fewer years of schooling than a child in Europe or the Americas (p. 12). The report notes that these differences are further exacerbated when tertiary education is factored into the comparison. It is the assertion here that the high rate of repetition can be traced to unscrupulous teachers who deliberately fail to teach students what they should know in the regular classroom sessions and educational systems that fail to regulate the activities of teachers. These teachers offer parents and their wards weekend classes during the regular school year and remedial classes when the students fail their final exams. Thus, not only is the continent not producing the necessary educated workforce, it is also wasting a significant portion of its investments in education and guaranteeing that its future will not be much different from the present.

In a small number of African countries, school life expectancy exceeds 11 years: Botswana, Cape Verde, Gabon, Libyan Arab Jamahiriya, Malawi, Mauritius, Namibia, Seychelles, South Africa, Tunisia and Uganda. At the other end of the spectrum, there are countries with less than five years of school life expectancy, namely Angola, Burkina Faso, the Central African Republic, Djibouti, Eritrea, Mali, Niger and the United Republic of Tanzania. (UNESCO p. 12)

The next section will look at the statistics for a few West African countries. It must also be pointed out that statistics on Africa tend to be sparse and often unavailable for all countries.

As Table 2 shows, primary education gets 34% of educational outlays, secondary education 45% and tertiary education 18%. Thirty-five percent of adults and approximately 22% of youth are illiterate. Forty-nine percent of the population is in the urban areas.

Table 2

School enrollment and Allocation of Expenditures by Level of education in Ghana

Level of Education	Eligible % enrolled	% Public expenditure
Pre-primary	60%	5%
Primary	72%	34%
Secondary	45%	42%
Tertiary	6%	18%

Table 3 shows a similar transition pattern for the Gambia. Expenditures on education are not available.

Table 3

School enrollment and Allocation of Expenditures by Level of education in Gambia

Level of Education	Eligible % enrolled	% Public expenditure
Pre-primary	22%	NA
Primary	71%	NA
Secondary	39%	NA
Tertiary	1.5%	NA

For Liberia, 41 percent of children are in pre-primary, 42 percent in primary school, 27 percent in secondary school and 8 percent in tertiary.

Table 4

School enrollment and Allocation of Expenditures by Level of education in Liberia

Level of Education	Eligible % enrolled	% Public expenditure
Pre-primary	41%	NA
Primary	42%	NA
Secondary	27%	NA
Tertiary	8%	NA

For Nigeria, the statistics are sparse. However, as of 1999, 58 percent of children who were eligible were in primary school.

Table 5

School enrollment and Allocation of Expenditures by Level of education in Nigeria

Level of Education	Eligible % enrolled	% Public expenditure
Pre-primary	NA	NA
Primary	58 (1999)	NA
Secondary	NA	NA
Tertiary	6% (1999)	NA

In Sierra Leone, only 5% of children are enrolled in pre—primary school twenty-three percent in secondary school and 2 percent in tertiary education.

Table 6

School enrollment and Allocation of Expenditures by Level of education in Sierra Leone

Level of Education	Eligible % enrolled	% Public expenditure
Pre-primary	5	NA
Primary	NA	52
Secondary	23 (2007)	27
Tertiary	2	20

Figures are estimates by UIS

War, civil strife, mismanagement, and corruption account for some of the dismal figures. Liberia and Sierra Leone have experienced a lot of political instability in recent years. For all the countries, there is a large urban population component. Lack of development in the rural areas forces people to migrate to the urban areas. However, their lack of education and skills only exacerbates the situation in the urban areas.

EDUCATION AND DEVELOPMENT

The progression through the stages of development goes hand-in-hand with increases in the educational and skills level of the population. (McMahon, 1999) The first phase of development-agrarian society requires the least education. The use of these implements only requires very basic skills that are easily passed down from generation to generation. To move to the next stage of development, manufacturing higher skills than the ability to swing a machete are required. This second stage requires higher skill levels that can only be attained through education and skills training. While basic education may be sufficient for basic manufacturing endeavors, higher level skills are required for more complex manufacturing processes and products.

Africa is giving away its wealth to other nations principally because of the lack of education, poor education and poor planning that does not synchronize whatever education programs are developed with the need for the particular

knowledge and skills. It is not uncommon to find college graduates with degrees in political science being hired in banks or persons with history degrees hired for administrative positions in hospitals. Often, most of them never learn enough to be really productive in their positions. This means that productivity of many organizations is well below what it should be. In money terms, African nations are not getting adequate returns on their investments in education.

There are several consequences to the lack of education or the improper education and placement of people across the African continent. The large numbers of young school-age children who do not attend school and remain illiterate and unskilled.

1. Can not be gainfully employed in good paying positions since they lack education and skills.
2. Will remain part of an underclass that will have to be supported with social programs paid for by those who make the effort to get education and skills and who end up paying the bulk of taxes.
3. May, as they grow up, turn to criminal and anti-social activities that prey on those who made the effort to get education and skills.
4. Perpetuate a vicious cycle of a burdensome underclass that siphons off necessary resources from national development.

ENSURING THE FUTURE

Education is an imperative to saving Africa's future. This focus on education must involve finding solutions for the things that have already gone wrong (the lack of education and skills of vast numbers of its people) as well as planning for the future (providing the requisite educated and skilled workforce needed for economic development). These must occur simultaneously.

Several programs are needed to convert the uneducated and unskilled into viable contributors to national development. Among these prescriptions are:

1. Adult education/skills training for those who are past the ages for formal education.
2. Remedial education for those who were in the education system but either failed the final exams to complete their education or dropped out of school
3. Performance-based pay, promotion and tenure to instill and ensure accountability by those who are responsible for educating the nation. This should include not only the teachers, but the principals and education officers.
4. Use of compulsory education mandated by constitutional or legislative law. These laws should require that children within a certain age range are enrolled in school. The modern standard (e.g. the Convention on the Rights of the Child) views compulsory education as an obligation primarily of the State itself, and thus, implementation is best achieved by (1) making education available, (2) ensuring it is of a high quality to attract learners, and (4) providing a sufficient budgetary support for education programs (UNESCO, p. 20). Compulsory education needs to be extended to the uneducated, unskilled adult population if the nations are to get the most benefits from education and build solid foundations for their economic development.

As steps are being taken to correct the wrongs of the past, the necessary steps should also be taken simultaneously to plan the future. This should include:

1. National development planning that involves the identification of the direction in which nations should go based on an analysis of the nations' resources and capabilities (possessed or to be developed) and the identifications of the areas of economic activity to pursue.
2. Continuity in spite of party in power to break the tendency of African governments to undo what their predecessors have done and restart new things. National development should transcend political orientation and groups.
3. Targeting resources such as scholarships and equipment for specific types of education and educational institutions based on the functions they are chosen to perform. For example, a decision to develop tourism must be accompanied by the provision of scholarships and resources to that effort.

4. Creating jobs across the nation- regional, district, local development- to ensure that the graduates of the educational institutions have jobs. The statistics reviewed earlier show that very large numbers of people live in the urban areas although they do not have the necessary education and skills for urban employment. This is because there is no development in the rural areas and, therefore, no jobs in those areas. By creating jobs in the rural areas the exodus to the areas will stop.

CONCLUSION

Africa, the world's most bountifully endowed continent, remains the poorest because of a lack of education. This most change. This effort seeks to integrate the principles, values, and practices of sustainable development into all aspects of education and learning, in order to address the social, economic, cultural and environmental problems we face in the 21st century. Education for sustainable development aims to help people to develop the attitudes, skills and knowledge to make informed decisions for the benefit of themselves and others, now and in the future, and to act upon these decisions. We have to learn our way out of current social and environmental problems and learn to live sustainably. (UNESCO, 2009)

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HYBRID CLOUD COMPUTING: AN ALTERNATIVE MODEL FOR E-GOVERNANCE WITH PROMISED SECURITY AND SCALABILITY

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ABSTRACT:

As the cloud computing based services are becoming more and more attractive due to its many advantages like cost saving, elasticity, and scalability. Governments around the world are planning to adapt cloud computing as a means to increasing efficiency and reducing cost of their IT services. In this research paper efforts have been made to analyze the use of hybrid cloud computing model with security and scalability in e-governance. With many advantages of cloud computing we have many challenges also in using cloud computing. The main challenges are security, performance, availability etc. In addition to the general challenges of developing secure IT system, cloud computing presents an added level of risk because all essential services are generally outsourced to a third party. The outsourcing makes it harder to maintain data integrity and privacy, support data and service availability, and demonstrate compliance. Using public cloud model only in the e-governance is very risky because of its security reasons but due to various advantages of cloud computing it is important to use public cloud model in the government. Using private cloud only will not solve the target purpose because in that case advantages of public cloud mode cannot be used. This research paper focused upon the security problems in e-governance. Research suggests a hybrid cloud computing model where integrated advantages of cloud and security of private cloud can be used. In this highly sensitive data can be stored in the private storage cloud and less sensitive data in public storage cloud. This study gives a new indicator towards scope of hybrid cloud computing with all expected objectives and consequences in governance processes.

KEY WORDS: Cloud Computing, Hybrid Cloud, Public Cloud, Private Cloud, Cloud Security etc.

1. INTRODUCTION: Cloud Computing is being transformed to a model consisting of services that are commoditized and delivered in a manner similar to traditional utilities such as water, electricity, gas, and telephony [1]. Using this model user can access services as per their requirement without knowing that where the services are hosted and how they are delivered. The cloud model represents nothing less than a fundamental change to the economics of computing and the location of computing resources [2].

1.1 CLOUD COMPUTING : Definition: Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction [3]. Cloud computing is a computing paradigm, where a large pool of systems are connected in private or public networks, to provide dynamically scalable infrastructure for application, data and file storage. With the advent of this technology, the cost of computation, application hosting, content storage and delivery is reduced significantly.

1.2 CLOUD COMPUTING DELIVERY MODELS :

1.2.1 SOFTWARE AS A SERVICE (SAAS): Software as a service model offers application as a service to the consumer on demand. It does not control the operating system, hardware or network infrastructure on which it's running. Through SaaS, companies can access applications and large amounts of virtual computing power without buying it. Rather, the application is hosted offsite by some other company, which cuts maintenance headaches and most of the setup costs for users. "You're getting all the functionality but none of the headaches of running the IT infrastructure in-house. No upgrades, no contract renewals, no security issues: The provider manages your service. You pay based on how much computing you use." [4]. SaaS allows SMBs to avoid hiring extensive IT staffs, managing software upgrades, or staying current with the latest releases – and it can unleash new capabilities because it evolves as their businesses evolve, Aoki says [5]. SaaS applications can be more easily integrated into other

elements of government infrastructure like combining an office communications system with an online collaboration platform like WebEx.

1.2.2 PLATFORM AS A SERVICE (PAAS): Platform as a service model offers a hosting environment for applications to the consumer on demand. The consumer controls the applications that run in the environment (and possibly has some control over the hosting environment), but does not control the operating system, hardware or network infrastructure on which they are running. The platform is typically an application framework. Platform as a Service (PaaS) helps developers in creating and delivering business applications on-demand. Developer can build enterprise-class applications quickly, built-in services (including analytics, globalization, security, mobility and compliance), development as a service, application exchanges, user interface as a service and integration as a service.

1.2.3 INFRASTRUCTURE AS A SERVICE (IAAS): Infrastructure as a service offers computing resources such as processing power, storage, networking components or middleware to consumer on demand. The consumer can control the operating system, storage, deployed applications and possibly networking components such as firewalls and load balancers, but not the cloud infrastructure beneath them. Infrastructure-as-a-Service provides virtual server instances with unique IP addresses and blocks of storage on demand. Customers use the provider's application program interface ([API](#)) to start, stop, access and configure their virtual servers and storage. In the enterprise, cloud computing allows a company to pay for only as much capacity as is needed, and bring more online as soon as required.

1.3 CLOUD COMPUTING DEPLOYMENT MODELS :

1.3.1 PUBLIC CLOUD: Public cloud services are the services those are available to clients from a third party service provider via the Internet. Public clouds are most often hosted away from customer premises, and they provide a way to reduce customer risk and cost by providing a flexible, even temporary extension to enterprise infrastructure. A public cloud does not mean that a user's data is publically visible; public cloud vendors typically provide an access control mechanism for their users. Public clouds provide an elastic, scalable, cost effective means to deploy solutions.

1.3.2 PRIVATE CLOUD: A private cloud offers many of the benefits of a public cloud computing environment, such as being elastic and service based. The difference between a private cloud and a public cloud is that in a private cloud-based service, data and processes are managed within the organization without the restrictions of network bandwidth, security exposures and legal requirements that using public cloud services might entail. In addition, private cloud services offer the provider and the user greater control of the cloud infrastructure, improving security and resiliency because user access and the networks used are restricted and designated.

1.3.3 COMMUNITY CLOUD: A community cloud is controlled and used by a group of organizations that have shared interests, such as specific security requirements or a common mission. The members of the community share access to the data and applications in the cloud.

1.3.4 HYBRID CLOUD: A hybrid cloud is a combination of a public and private cloud that interoperates. In this model users typically outsource non critical information and processing to the public cloud, while keeping critical services and data in their control. The multi-tenant model of public clouds attracts various government organizations, which reduced cost and development time. But the government sees the public nature of cloud as a big issue for adoption. Control of IT in case of using cloud computing remains with the third party (provider), which increases the threat, to public cloud's adoption. To handle the challenges of public cloud and use the advantages of private cloud a hybrid approach can be used that allow us to adopt the public cloud partially, deploying only those services which are suitable and less critical. The highly sensitive and critical data and services can be deployed on private (Internal) cloud. The success of this hybrid approach depends on how public and private cloud interacts and works together in union.

1.4 CLOUD ESSENTIAL CHARACTERISTICS

1.4.1 RAPID ELASTICITY: Elasticity is defined as the ability to scale resources both up and down as needed. To the consumer, the cloud appears to be infinite, and the consumer can purchase as much or as little computing power as they need. This is one of the essential characteristics of cloud computing.

1.4.2 MEASURED SERVICE: In a measured service, aspects of the cloud service are controlled and monitored by the cloud provider. This is crucial for billing, access control, resource optimization, capacity planning and other tasks.

1.4.3 ON-DEMAND SELF-SERVICE: The -demand and self-service aspects of cloud computing mean that a consumer can use cloud services as needed without any human interaction with the cloud provider.

1.4.4 UBIQUITOUS NETWORK ACCESS: Ubiquitous network access means that the cloud provider's capabilities are available over the network and can be accessed through standard mechanisms by both thick and thin clients.

1.4.5 RESOURCE POOLING: Resource pooling allows a cloud provider to serve its consumers via a multi-tenant model. Physical and virtual resources are assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter).

2. CLOUD COMPUTING SECURITY ISSUES

In cloud computing most of the control is with the service provider not with client organization. The client organizations must establish trust relationships with their service providers through service level agreement (SLA) and understand how these providers implement, deploy, and manage security. This relationship between cloud service providers and consumers is critical because the cloud service consumer is still ultimately responsible for compliance and protection of their critical data, even if that workload had moved to the cloud. In fact, some organizations choose private or hybrid models over public clouds because of the risks associated with outsourcing services [6].

2.1 PEOPLE AND IDENTITY SECURITY: Client organizations need to make sure that only authorized users have access to the data and tools that they need, and unauthorized access should be blocked. Cloud environments usually support a large number of users, so these controls are even more critical. In addition, clouds introduce a new tier of privileged users: administrators working for the cloud provider. Privileged-user monitoring, including logging activities, becomes an important requirement. Identity federation and rapid on boarding capabilities must be available to coordinate authentication and authorization with the enterprise back-end or third-party systems.

2.2 DATA AND INFORMATION SECURITY: Data protection is the most important security issue of most of the organizations. Typical concerns include the way in which data is stored and accessed, compliance and audit requirements, and business issues involving the cost of data breaches, notification requirements, and damage to brand value. All sensitive or regulated data needs to be properly segregated on the cloud storage infrastructure, including archived data. Encrypting and managing encryption keys of data in transit to the cloud or data at rest in the service provider's data center is critical to protecting data privacy and complying with compliance mandates.

2.3 APPLICATION AND PROCESS SECURITY: Clients typically consider cloud application security requirements in terms of image security. All of the typical application security requirements still apply to the applications in the cloud, but they also carry over to the images that host those applications. The cloud provider needs to follow and support a secure development process. In addition, cloud users demand support for image provenance and for licensing and usage control. Suspension and destruction of images must be performed carefully, ensuring that sensitive data contained in those images is not exposed.

2.4 NETWORK, SERVER, AND ENDPOINT SECURITY: In the shared cloud environment, clients want to ensure that all tenant domains are properly isolated and that no possibility exists for data or transactions to leak from one tenant domain into the next. To help achieve this, clients need the ability to configure trusted virtual domains or policy-based security zones. As data moves further from the client's control, they expect capabilities like Intrusion Detection and Prevention systems to be built into the environment. The concern is not only intrusions into a client's trusted virtual domain, but also the potential for data leakages and for extrusions, that is, the misuse of a client's domain to mount attacks on third parties. The organization must take the lead in terms of contract management for any risk assessments or controls deployment that it does not perform directly.

2.5 PHYSICAL INFRASTRUCTURE SECURITY: The cloud's infrastructure, including servers, routers, storage devices, power supplies, and other components that support operations, should be physically secure. Safeguards include the adequate control and monitoring of physical access using biometric access control measures and closed circuit television (CCTV) monitoring. Providers need to clearly explain how physical access is managed to the servers that host client workloads and that support client data.

3. HYBRID CLOUD MODEL FOR E-GOVERNANCE

Figure 1 shows the proposed model of hybrid cloud computing for e-governance. In this model we will discuss all the basic security points those should be considered when using hybrid cloud model for e-governance.

3.1 ACCESS CONTROL AND IDENTITY SERVICES: 69% of online users are using some form of cloud computing [7] out of which many users accessing government data and information from the cloud. Managing access control and identity in government information system is a great challenge. Following four major functions are essential for successful and effective identity management in cloud computing [8].

3.1.1 IDENTITY PROVISIONING: The secure and timely management of on-boarding (provisioning) and off-boarding (de provisioning) of users in the cloud is called identity provisioning. The rights and attributes of each person who accesses government IT system continually change as roles, rules, and policies changes within the government. The challenge is compounded during mergers and acquisitions, and when sharing IT privileges with other government departments and citizens.

3.1.2 AUTHENTICATION: Authenticating users in a trustworthy and manageable manner is very important in cloud computing. The government must address authentication-related challenges such as credential management, strong authentication (typically defined as multi-factor authentication), delegated authentication, and managing trust across all type of cloud services.

3.1.3 FEDERATION: In a Cloud Computing environment, Federated Identity Management plays a vital role in enabling organizations to authenticate their users of cloud services using the organization's chosen identity provider. Governments considering federated identity management in the cloud should understand the various challenges and possible solutions to address those challenges with respect to identity lifecycle management, available authentication methods to protect confidentiality, and integrity; while supporting non-repudiation.

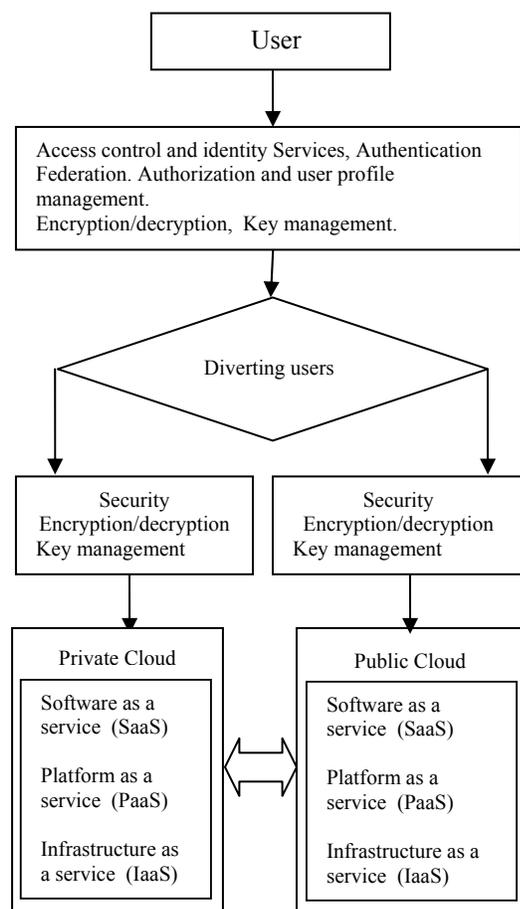


Fig (1) Hybrid cloud computing model for e-governance

3.1.4 AUTHORIZATION & USER PROFILE MANAGEMENT: The requirements for user profiles and access control policy vary depending on whether the user is acting on their own behalf (such as a citizen) or as a member of government (such as administration, university, hospital, or other government department). The access control requirements include establishing trusted user profile and policy information, using it to control access within the cloud service, and doing this in an auditable way.

3.2 DIVERTING USERS: On the basis of access control rights user should be diverted to access private or public cloud. Private cloud contains critical and very sensitive information due to that all users can not be directed to private cloud. Only the users those are authorized to access private cloud can be directed to private cloud they can also access public cloud, rest users those are not authorized to access private cloud can be directed to public cloud, they can access public cloud only.

3.3 DATA AND INFORMATION SECURITY IN GOVERNMENT HYBRID CLOUD MODEL: Security and data protection is the core principal of the government information system. Cloud customers and providers need to

guard against data loss and theft. Today, encryption of personal and enterprise data is strongly recommended, and in some cases mandated by laws and regulations around the world. Cloud customers want their providers to encrypt their data to ensure that it is protected no matter where the data is physically located. Likewise, the cloud provider needs to protect its customer's sensitive data. Following two functions are important to manage security of the data on cloud computing.

3.3.1 KEY MANAGEMENT: Before transferring data on the cloud it should be encrypted. Encryption keys should securely manage to prevent misuse or disclosure. Key management methodology can be used to secure key distribution. Keys should be recycled from time to time and old keys should be destroyed [9].

3.3.2 ENCRYPTION: Encryption is the most important part of the cloud security. Encryption on the data can be used at various places [10], For example, data in transit, data at rest and data in memory or process. Encrypting and managing encryption keys of data in transit to the cloud or at rest in the service provider's data center are critical to protect data privacy and comply with compliance mandates [11]. The encryption of mobile media and the ability to securely share those encryption keys between the cloud service provider and consumer is an important and often overlooked need. Because moving large volume of data quickly and cheaply over the Internet is still not practical in many situations, many organizations must send mobile media, such as an archive tape, to the cloud provider. It is critical that the data is encrypted and that only the cloud provider and client have access to the encryption keys.

3.4 INTERNAL (PRIVATE) CLOUD: Data privacy and security related challenges cannot be ignored for a large category of the business scenario where customer information and business critical intelligence is involved [12]. By building private enterprise cloud, government can keep the sensitive data within their control boundaries and allow them to use existing infrastructure effectively.

3.5 EXTERNAL (PUBLIC) CLOUD: Public clouds are owned and operated by third parties; they deliver superior economies of scale to customers, as the infrastructure costs are spread among a mix of users, giving each individual client an attractive low-cost, "Pay-as-you-go" model [13]. All customers share the same infrastructure pool with limited configuration, security protections, and availability variances. These are managed and supported by the cloud provider.

3.6 SECURE COMMUNICATION: Communication between internal and external cloud should be properly protected. It is important to ensure that access to the internal infrastructure is only possible through secure communications. Data or information should be encrypted using encryption key before Communicating between public and private cloud. At the destination data can be decrypted using decryption key.

4. CONCLUSION: The hybrid approach using internal (private) and external (public) cloud brings together the best of both worlds for government information system. It also changes management processes, organization, culture, and relationships between government and public. These changes will make it easier for government and citizens to make good cloud-sourcing decisions and transitions in the future. From an outcome perspective, this hybrid cloud model will provide government with a simple and cost-effective way to provision IT services, irrespective of where the services are hosted or provisioned. The hybrid cloud enables standardization at new levels which reduces IT complexity, and in the end provides a more reliable and feature rich IT service resource for citizens.

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SEARCH ENGINE OPTIMIZATION USING QUERY PARSING

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ABSTRACT:

The Internet has become a vast information source in recent years. Searching the desired information or document via internet is one of the most important issues. Every search engine has its own database that defines its own set of documents which are searched by the search engines. No single search engine is capable of searching all kinds of data via Internet. In the modern practices, an interface is created to call multiple search engines in order to satisfy the users query. Calling all search engines for each users request is not feasible as it increases the cost because the network traffic is increased by sending the query to different search engines, some of which may be useless. The problem can be solved by parsing the user's query. The research paper suggests an accurate and fast search mechanism using query parsing techniques.

Keywords: Meta search engine, parsing, information retrieval, search engines, network traffic.

INTRODUCTION

Nowadays, internet has become an important source of information. To find the desired data on internet, many search engines have been created. Every search engine has its own database that defines the set of documents that can be searched by the search engine. Generally, the index is created in the database for each documents and it is stored in the search engine which is used to identify the document in the database. Since, the index is already there in the database hence, it becomes very difficult for the search engine to answer the user's query efficiently.

There are two types of search engines which exist in the market, namely, General purpose search engines and Special purpose search engines. General purpose search engines provide searching capabilities for all kinds of documents on the internet while Special purpose search engines focus on documents which are confined to specific domain. Google, Alta vista and HotBot are example of General purpose search engines whereas there are millions of Special purpose search engines which currently available on the internet.

The number of web pages is increasing at very high rate on the internet. Therefore, it is very monotonous to find all kind of data in a single search engine due to several reasons. First, the processing power and storage capabilities may not scale to the rapidly increasing and virtually infinite amount of data. Second, collecting all kind of data on the internet and maintaining it rationally up to date is not easy task if not possible. It becomes a time consuming process for the crawlers which are used by the search engines to collect the data automatically.

An alternative approach is to use the multilevel search engines over the internet. At the lower level, local search engines are used which are grouped at higher level based on the relatedness of their database which in turn, grouped together to form next higher level and so on. At the top level, we have only one search engine called Meta search engine. Whenever, the Meta search engine receives the request from the user in the form of query, it passes the request to appropriate (Meta) search engine in depth first search order. This approach has its own advantages. First, the response time of the query processing is substantially reduced because user queries are evaluated against smaller database in parallel. Second, the index of the local search engine is modified only when the documents in its database are updated, i.e. updating of index is localized. Third, the local information can be collected more conveniently, easily and timely. Last, but not the least, the memory space and processing power of each local search engine can be managed easily. The schematic diagram for the above mentioned scheme is shown below in fig 1.

When a single search engine calls many Meta search engines, there may be serious problem of inefficiency. For example, for a given query, only small fraction of all search engines may contain useful documents. As a result, if every search engine is called for each query, then there may be substantial loss of network bandwidth and network traffic may be created. Moreover, local resources of each search engine will be wasted when useless databases are searched. The most appropriate solution to this problem is to first identify those search engines that are most likely

to provide useful results to a given user query and then pass it to the appropriate search engine for desired documents. But the question is how to identify potentially useful search engines. The solution to the above problem is to rank all underlying databases in decreasing order of their usefulness for each query using some metadata that describes the contents of each database. Generally, the ranking is based on some parameters which ordinary users may not be able to utilize to fit their needs. The current approach can describe the user, to some degree of accuracy, which search engine is likely to be the most useful, the second most useful, etc for a given user query. Although, such ranking scheme will be useful but it can not say anything about the usefulness of any particular search engine to the user.

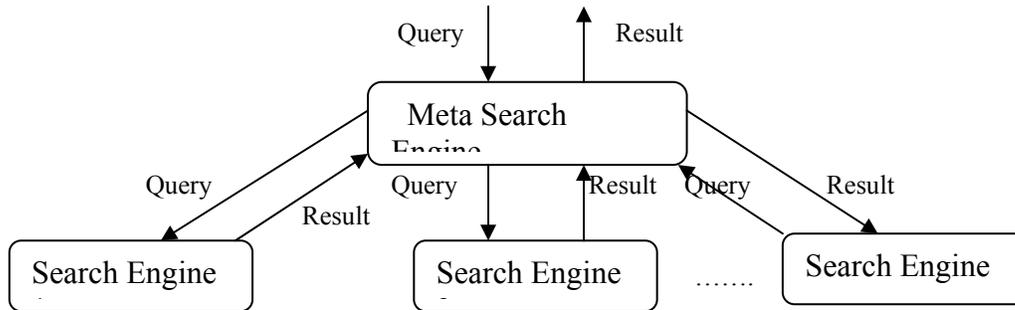


Fig 1: A Typical Meta Search Engine

The usefulness of any search engine for a given user query is measured in terms of two parameters, first, the number of documents (NoDoc) in the database of the search engine that is more likely to be useful to the query, that is, the similarities between the query and the documents as measured by a certain global similarity function are higher than a specified threshold, and second, the average similarity (AvgSim) of these potentially useful documents. It is important to keep in mind that the global similarity function may vary with the local similarity function used by a local search engine. These two parameters together describe the usefulness of any search engine for a given user query. Mathematically, these terms can be defined as follows:

$$NoDoc(T, q, D) = \text{cardinality}(\{d \in D \mid sim(q, d) > T\}) \tag{1}$$

And

$$AvgSim(T, q, D) = \frac{\sum_{d \in D / sim(q, d) > T} sim(q, d)}{NoDoc(T, q, D)} \tag{2}$$

Where, T : a threshold value

D : database of the search engine

$sim(q, D)$: similarity between user's query q and document d in the database D .

It is very important for the users to determine which search engine to use and how many numbers of documents to be retrieved from the each search engine. For instance, if the user can forecast that a highly ranked search engine with a large database has very few useful documents and searching such a large database is not cost effective, then the user may not use that search engine. The cost of using such a search engine can be reduced by limiting the number of documents to be returned to the number of useful documents in the search engine.

In this paper, a new measure which is easy to understand and informative is proposed to characterise the usefulness of a search engine with respect to the users query. Next, a subrange based estimation method is proposed to recognize search engines to use for a given query and to estimate the usefulness of a search engine for the query.

RELATED WORK

In order to discover useful search engines to a query, some attributes about the database of each search engine must be stored in the Meta search engine. Such information is known as the representative of a search engine. Based on the representatives used, different methods can be developed for identifying useful search engines.

Several Meta search engines are in working using a range of methods to recognize potentially useful search engines [3], [5], [7], [8], [9] and [10]. However, the database representatives used in most Meta search engines cannot be

used to estimate the number of globally most similar documents in each search engine [1], [7], [8] and [10]. In addition, the precautions that are used by these Meta search engines to rank the search engines are not easy to understand. As a result, separate methods have to be used to convert these measures to the number of documents to retrieve from each search engine.

Another shortcoming of these measures is that they are independent of the similarity threshold. As a result, a search engine will always be ranked the same regardless of how many documents are desired, if the databases of these search engines are fixed. This is in conflict with the following situation. For a given query, a search engine may contain many moderately similar documents but very few or zero highly similar documents. In this case, a good measure should rank the search engine high if a large number of moderately similar documents are desired and rank the search engine low if only highly similar documents are desired.

A probabilistic model for distributed information retrieval is proposed in [2]. The method is more suitable in an environment where documents previously retrieved have been identified to be either relevant or irrelevant.

A database of m distinct terms is represented in gGLOSS [5] by m pairs $(f_i:W_i)$, where f_i is the number of documents in the database that contain the i^{th} term and W_i is the sum of weights of the i^{th} term over all documents in the database, $i = 1, 2, 3, \dots, m$. The usefulness of a search engine with respect to a given query is defined to be the sum of all documents similarities with the query that are greater than a threshold

A method is proposed in [8] to estimate the number of useful documents in a database for the binary and independent case. In this, each document d is represented as a binary vector such that a 0 or 1 at the i^{th} position indicates the absence or presence of the i^{th} term in document d , and the occurrences of terms in different documents are assumed to be independent. A significant amount of information will be lost when documents are represented by binary vectors. As a consequence of which, these methods are rarely used in practice. The estimation method in [6] assumes term weights to be non-binary.

USEFULNESS ESTIMATION

In this section, the basic method for estimating the usefulness of a search engine is described which allows the values of the term weight to be any non-negative real numbers. The basic assumptions used in this method are: the distributions of the occurrences of the terms in the documents are independent and all documents having a term have the same weight for the term for a given database in the search engine. This basic method can very accurately estimate the usefulness of the search engine. Next, subrange-based statistical method is described which can eliminate the second assumption.

BASIC METHOD

Consider a database D of a search engine with m distinct terms. Each document d in the database can be represented as a vector $\vec{d} = (d_1, d_2, \dots, d_m)$, where d_i is the weight of the i^{th} term t_i in representing the document, $1 \leq i \leq m$. Let us consider the query $q = (u_1, u_2, \dots, u_m)$, where u_i is the weight of the t_i in the query, $1 \leq i \leq m$. If the term does not appear in the query, then its corresponding weight will be zero. The similarity between query q and document d can be defined as the dot product of their respective vectors, i.e. $sim(q, d) = u_1 * d_1 + \dots + u_m * d_m$.

In this method, the database D is represented as m pairs $\{(p_i, w_i)\}$, where $1 \leq i \leq m$ and p_i is the probability that term t_i appears in a document in D and w_i is the average of the weights of t_i in the set of documents containing t_i . For a given query $q = (u_1, u_2, \dots, u_m)$, the database representative is used to estimate the usefulness of database D .

Consider the following generating function:

$$(p_1 * X^{u_1 * w_1} + (1 - p_1)) * (p_2 * X^{u_2 * w_2} + (1 - p_2)) * \dots * (p_m * X^{u_m * w_m} + (1 - p_m)) \quad \dots \dots (3)$$

where, X is a dummy variable.

Let us consider the query q and database D . If the terms are independent and the weight of term t_i whenever present in a document is w_i , which is given the database representative $(1 \leq i \leq r)$, then the coefficient of X^s in the above function is the probability that a document in D has similarity s with q .

SUBRANGE BASED ESTIMATION METHOD

In the basic method, it was assumed that all documents having a term have the same weight for the term. While in realistic, it is not so. This sort of problem is overcome in the subrange based statistical method. The different documents having a term may have different weight for the term.

Let us consider a term t , \bar{w} the average and σ be the standard deviation of the weights of term t in the set of documents containing the term t . Let p be the probability that the term t appears in a document in the database.

Let t be the term in a specific query then the following equation is included in the probability generating function:

$$p * X^{u * n} + (1 - p) \dots \dots \dots (4)$$

where, u is the weight of the term in the user query. The above equation assumes that the term t has uniform weight of w for all documents containing the term while in reality the term weights may have non-uniform distribution among the documents having the term. Let the weights of the terms be w_1, w_2, \dots, w_k ,

Where, $w_1 > w_2 > \dots > w_k$

k : the number of documents having the term and $k = p * n$ and

n : the total number of documents in the database.

Now, suppose that we partition the weight range of t into four subranges, each containing 25 percent of the term weights, as follows. The first subrange contains the weights from w_1 to w_s , where $s = 25\% * k$; the second subrange contains the weights from w_{s+1} to w_t , where $t = 50\% * k$; the third subrange contains the weights from w_{t+1} to w_v , where, $v = 75\% * k$ and the last subrange contains weights from w_{v+1} to w_k . In the first subrange, the median is the $(25\% * \frac{k}{2})$ th weight of the term weights in the subrange and is w_{m1} , where, $m1 = 12.5\% * k$; similarly, the median weights in the second, the third, and the fourth subranges have median weights w_{m2} , w_{m3} and w_{m4} , respectively, where, $m2 = 37.5\% * k$, $m3 = 62.5\% * k$, and $m4 = 87.5\% * k$.

Then, the distribution of the term weights of t may be approximated by the following distribution: The term has a uniform weight of w_{m1} for the first 25 percent of the k documents having the term, another uniform weight of w_{m2} for the next 25 percent of the k documents, another uniform weight of w_{m3} for the next 25 percent of documents and another uniform weight of w_{m4} for the last 25 percent of documents.

With the above weight approximation, for a query containing term t , polynomial (4) in the generating function can be replaced by the following polynomial:

$$p_1 * X^{u * m1} + p_2 * X^{u * m2} + p_3 * X^{u * m3} + p_4 * X^{u * m4} + (1 - p) \dots \dots \dots (5)$$

Where, p_j is the probability that term t occurs in a document and has a weight of w_{m_j} , for $j = 1, 2, 3, 4$. Since, 25% of those documents having term t are assumed to have a weight of w_{m_j} for term t , for each j , $p_j = p/4$. Essentially, polynomial (5) is obtained from polynomial (4) by decomposing the probability p that a document has the term into four probabilities, p_1, p_2, p_3 and p_4 , corresponding to the four subranges.

It is important to note that the subrange-based method needs to know the standard deviation of the weights for each term. As a result, a database with m terms is now represented as m triplets $\{(p_i, \bar{w}_i, \sigma_i)\}$, for $i = 1, \dots, m$, where p_i is the probability that term t_i appears in a document in the database, \bar{w}_i is the average weight of term t_i in all documents containing the term and σ_i is the standard deviation of the weights of t_i in all documents containing t_i . Furthermore, if the maximum normalized weight of each term is used by the highest subrange, then the database representative will contain m quadruplets $\{(p_i, \bar{w}_i, \sigma_i, m_{wt})\}$, with m_{wt} being the maximum normalized weight for term t_i . The experimental results indicate that the maximum normalized weight is a critical parameter that can drastically improve the estimation accuracy of search engine usefulness.

ISSUES ON APPLICABILITY

If the representative of a database used by an estimation method has a large size relative to that of the database, then estimation method will have a poor scalability, as this method is difficult to scale to thousands of text databases.

Suppose each term occupies four bytes and each number (probability, average weight, standard deviation, and maximum normalized weight) also occupies 4 bytes. Consider a database with m distinct terms. For the subrange-based estimation method, m probabilities, m average weights, m standard derivations, and m maximum normalized weights are stored in the database representative, resulting in a total storage overhead of $20 * m$ bytes.

If the number of search engines is very large, the representatives can be clustered to form a hierarchy of representatives. Each query is first compared against the highest level representatives. Only representatives whose ancestor representatives have been estimated to have a large number of very similar documents will be examined further. As a result, most database representatives will not be compared against the query.

To obtain the accurate representative of a database, we need to know the following information: first, the number of documents in the database, second, the document frequency of each term in the database (i.e., the number of documents in the database that contain the term) and third, the weight of each term in each document in the database. First two things are needed to compute the probabilities and third one is needed to compute average weights, maximum normalized weights, and standard deviations. First two things can be easily obtained. For example, when a query containing a single term is submitted to a search engine, the number of hits returned is the document frequency of the term.

In an environment where internet is used, it may not be feasible to anticipate a search engine to provide the weight of each term in each document in the search engine. Following techniques can be used to obtain the average term weight, their standard deviations and maximum normalized term weights.

1. Sampling technique can be used to estimate the average weight and the standard deviation for each term. When a query is submitted to a search engine, a set S of documents will be returned as a result of the search. For each term t in S and each document d in S , the term frequency of t in d (i.e., the number of times t appears in d) can be computed. As a result, the weight of term t in document d can be computed. If the weights of t in a reasonably large number of documents can be computed then an approximate average weight and an approximate standard deviation for term t can be obtained. Since, the returned documents for each query may contain many different terms, the above estimation can be carried out for many terms at the same time.
2. Find out the maximum normalized weight for each term t directly as follows with respect to the global similarity function used in Meta search engine: submit term t as a single term query to the local search engine which retrieves documents according to a local similarity function.

CONCLUSIONS

The paper introduces the usefulness measure of the search engine which is intuitive and easily understood by the users. A statistical method is presented to estimate the usefulness of a given search engine with respect to each query. Accurate estimation of the usefulness measure allows a Meta search engine to send queries to only the appropriate local search engines to be processes which in turn will save both the communication cost and the local processing cost substantially. Estimation method has the following properties:

1. The estimation makes use of the number of documents desired by the user (or the threshold of retrieval), unlike some other estimation methods which rank search engines without using the above information.
2. It guarantees that those search engines containing the most similar documents are correctly identified when the submitted queries are single-term queries. Internet users submit a high percentage of such short queries and they can all be sent to the correct search engines to be processed.

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COMPACT VISUAL IDENTITY CHARACTERIZATION (CVIC) TO ENHANCE INFORMATION VERIFICATION IN VIDEO SECURITY SYSTEMS

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ABSTRACT

Situation awareness (SA) can be defined as the perception of the elements of the environment (physical or virtual) within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future. In the last decade, cyber and physical security gained significant interests, especially in applications such as military, homeland security, ecommerce, banking, etc. To build an effective security system, there are many requirements that are crucial to successful operation of such system. One of the vital requirements among these is the deployment of reliable soft and hard agents who are equipped with capabilities enabling them to monitor the environment, collect relevant data, process data in real time, perform local inference about a situation, communicate critical information to decision making center, etc. In this paper, we introduce a new technique to enhance soft agent data processing and information sharing with hard agents in a networked security system. Although we recognize the equal importance of the cyber security in the system, we shall focus only on the physical aspects of the system and leave the cyber security as a future work. The new technique is concerned with subject visual characterization via color pattern modeling, including hair, skin, top clothes, and bottom clothes color patterns. As we recognize that hair, skin, and clothes may exhibit great deal of variation in a monitored environment, it would be difficult for a soft or hard agent to systematically identify subjects by their appearance. Therefore, we propose an efficient technique based on image processing and augmented image-space clustering to process the subject appearance and suggest a color pattern for four main segments of the body namely: hair, face, top and bottom color patterns. The technique produces a single color representation per each segment, where, this information is embedded in an information packet and shared with peer agents and/or with a server agent to be used in decision making at command center. Preliminary experimental work suggests that the proposed technique is effective and promising to be used in different applications such as the ones mentioned earlier and can be extended to semantic-based image archiving and retrieval.

KEYWORDS

Visual Characterization, Situation Awareness, Soft and Hard Agents, Homeland Security, Networked Security Systems, Subject Color-Pattern Modeling, Semantic-based Image Archiving and Retrieval.

1.0 INTRODUCTION AND RELATED WORK

Future video security systems (VSS) are highly motivated applications for sensor networks due to their need for the important functionalities that sensor networks have to offer. These functionalities include: monitor the environment, collect relevant data, process data in real time, perform local inference about a situation and communicate critical information to decision making center. Such applications include: homeland security, battlefield intelligence, border monitoring and protection, facility guarding and other civilian applications (Rababaah, 2009). Such systems require efficient and effective communication protocols, data and information fusion models, intelligent cognition schemes, data visualization, intelligent reasoning methods, and human computer interfacing for improved situational awareness (Rababaah, 2007). The popularity and motivations of VSS have risen significantly due to the dramatic changes and complexity of the human society (Bigdelil, 2007), (Alonso, 2007), (Lai, 2007) and (Krikke, 2006). Population growth, science, technology revolutions, and globalization have made the world a small village. Given this environment, modern VSS have a wide variety of forms and levels of sophistication that depend upon the scale, application type, objectives sought, complexity, and the sensitivity of the system. Nowadays, VSS applications include: battlefield intelligence, homeland security, home monitoring, business security, traffic, research, astronomy, medical, Industry, and Information security (Ahmedali, 2006), (Goujou, 1995), (Br'emon, 1998), (Foresti, 1998), (Eng, 2004) and (Chong, 2003). In particular, interests in large-scale sensor networks have been expanding due to rising demands in homeland security, battlefield intelligence, and network-centric surveillance systems (Kogut, 2000), (Trivedi, 2005), (VSAM, 2009) and (lifa, 2005).

Surveillance is defined as the process of monitoring targets behavior, such as humans, objects, processes or phenomena via a network of single/multi-modality sensors (digital cameras, infrared cameras, acoustic, radar,

seismic, laser, etc.), where these behaviors are tested against predefined norms of patterns and trends (Rababaah, 2007). VSS typically consist of several processing stages including: environment sensing, data conditioning, target detection, target localization and tracking, event characterization, local data fusion, network data communication, multi-agent data/information fusion, and situation assessment. These processing stages collectively aim to monitor the behavior of subjects of interest (SOIs) tested against expected or desired norms of patterns and trends to arrive at real time situation awareness and consequently taking the right decisions and actions. As can be observed from this definition, the surveillance process is high dynamic and complex problem. In order for the surveillance process to be complete and successful, there are two other technologies need to be integrated with this basic concept of surveillance. These are: Multi-Source Data Fusion (MSDF) and Situation Awareness (SA). MSDF is defined as the process of combining data and information from different sources: sensors, agents, reports, databases, etc. to perform inferences that may not be possible from a single source alone (Hall,2004). SA is the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future.” (Jing, 2007). In their review of theoretical underpinnings of situation awareness discussed the high significance of the focus of attention of the system resources and operators to the important and relevant world cues. They argued that more data does not mean more information, where typically a real world system can provide overwhelming amount of data that its vast majority might not be relevant to the situation awareness question. Previous works (Rababaah, 2007), (Jing, 2007) and (Endsley, 1988) greatly supports our proposed concept of subject compact visual characterization, which in-turn makes situational awareness process more efficient and effective.

Although, much work has been done in the area of VSS, there still exist some crucial concerns that need to be addressed comprehensively for improving system reliability and robustness (Rababaah, 2009), (Rababaah, 2007). One of these requirements is that of is enhancing the schemes in which security agents collect and share information across the security network. It is important to clarify the meaning of agents in this context. In VSS, there are two types of deployed agents to monitor a security environment. Soft agents are human agents equipped with data collection devices such as sensors, cameras, wearable devices, etc. to enable them to monitor the environment, collect data and information, and propagate relevant and urgent information over the network. On the other hand, hard agents are hardware and software deployed within the security network to behave as virtual agents that have capabilities that complements those of soft agents.

The rest of the paper is organized as follows: *section 2* presents the theoretical formulation of the problem and discusses the technical methodology followed in developing the proposed concept. *Section 3* presents the experimental procedures conducted to test and verify the developed technique and analyze the results as compared to human and another well-known image analysis software package. Finally, *section 4* concludes with our observations on our experience in this research work and anticipated future work.

2.0 THEORETICAL BACKGROUND AND TECHNICAL APPROACH

In this section, the concepts and theoretical backgrounds of the proposed technique are presented and discussed. The demonstration and experimentation of the different stages of the process flow will be presented in section 3.0, the experimental work and results analysis. Figure 1 depicts the system level architecture of the concept, the process flow diagram and the different components of the proposed approach. As it can be observed, we labeled each block in the diagram (Figure 1) with a sequence number, so that, we can easily reference it in the discussion in this section and this document. The different blocks of Figure 1 are presented and discussed as follows:

Block-1 presents the monitored environment including subjects of interest (SOIs), where, human-environment, human-object and human-human interactions are mainly targeted to try to characterize the different interactions that may occur in the space-time volume. These interactions and events are processed to be classified as suspicious or non-suspicious events. The level of severity may be also evaluated to be able to better assess the impact of these events on the system and the type of response needed. For more detailed discussion on this subject, the reader is advised to review our related works of (Rababaah,2009), (Rababaah, 2007). *Block-2* depicts the hard sensors, which are assumed to be intelligent sensors equipped with embedded system and digital camera. These sensors are capable of sensing, processing, storing information and data communication as assumed also in (Rababaah, 2007). *Block-3* represents motion detection where, targets of interest are detected based on their motion events and tracked in the environment. Two models are tested for this component, namely, Gaussian Mixture Model (GMM) and Temporal Differencing Model (TDM).

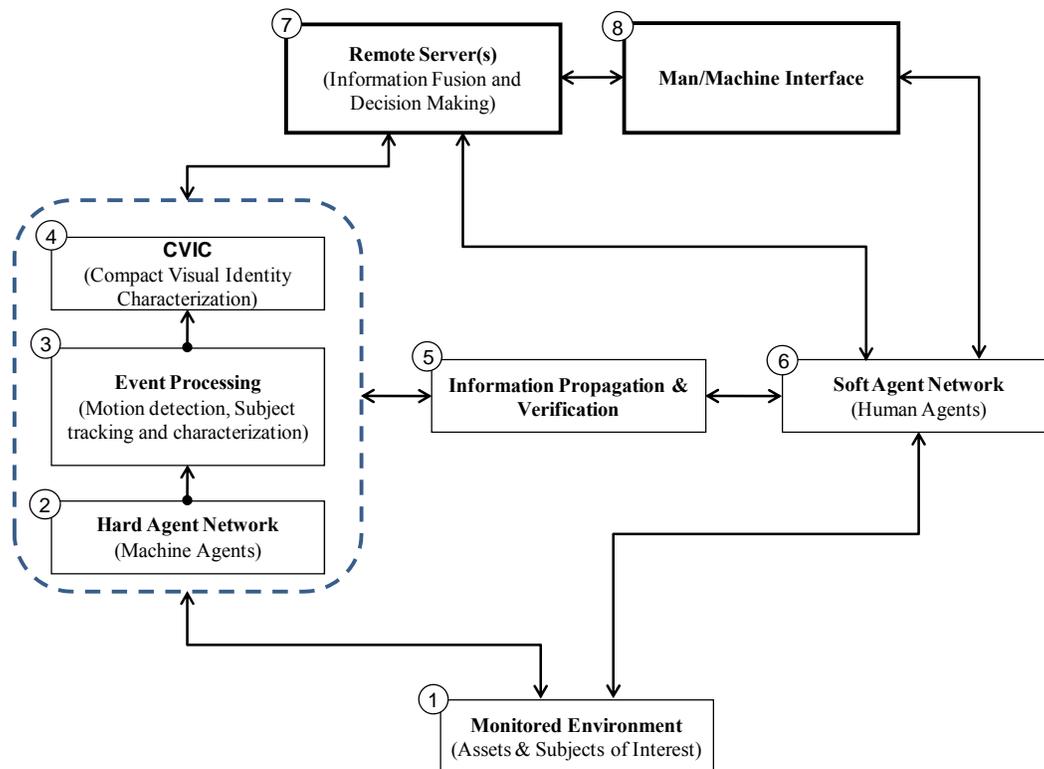


Figure 1 Conceptual Architecture of the Proposed CVIC Technique

GMM technique does not rely on frame subtraction. Instead, it samples the background for a satisfactory number of frames and builds a Gaussian model for each pixel by computing mean and standard deviation for each pixel. A separate Gaussian PDF model for red, green and blue buffers are established and maintained as gray image-buffer. After generating the model, the current frame can be tested pixel by pixel against all RGB buffers to compute the likelihood that a pixel belongs to the background model or to foreground. The second motion detection model is the Temporal Differencing Model (TDM). TDM detects motion events by performing absolute subtraction of the two consecutive frames. The frame subtraction is performed on the three RGB buffers. The mathematical models of these two models are presented in our previous work in (Rababaah, 2007). The main advantages of the TDM over the GMM include its simple implementation and low execution-time complexity. On the other hand, GMM is more robust in extracting a better quality motion regions as opposed to the TDM which inherently extracts edges of the motion regions. *Block-4* is the body segmentation is performed on each of the regions of interest extracted from the current image frame. For this purpose, the target is assumed to be in standing posture. A Heuristic model is used to segment the human standing posture into three segments, head, top and bottom. This model mathematically expressed as: Let L_i be the height of an isolated region of interest R_i , then, the three segments of the body, namely, head (H_i), top (T_i) and bottom (B_i) are given by:

$$H_i = 0.1366L_i, \quad T_i = 0.3370L_i, \quad B_i = 0.5264L_i \quad (1)$$

After the head section has been located, an augmented image color-space of 5D spatio-color clustering technique is used to successfully identify two main regions on the head section, namely, the hair subsection and the face subsection. This step facilitates the perception tagging of the hair color and face skin color. The augmented 5D spatio-color image space can be expressed as follows: Let $I(x,y)$ be a pixel at the x, y coordinates of the image frame I and r, g, b are the red, green, blue normalized color components of the pixel $I(x,y)$ then, the feature vector of the pixel $I(x,y)$ used to represent the pixel in the clustering algorithm can be written as:

$$v_{x,y} = [r_{x,y}, g_{x,y}, b_{x,y}, x, y]^T \quad (2)$$

The top and bottom sections are processed at this stage similarly by the applying the mode statistic to the the HIS color space and using a heuristic classification model to tag both regions as shown in the algorithm and Figure 2 below.

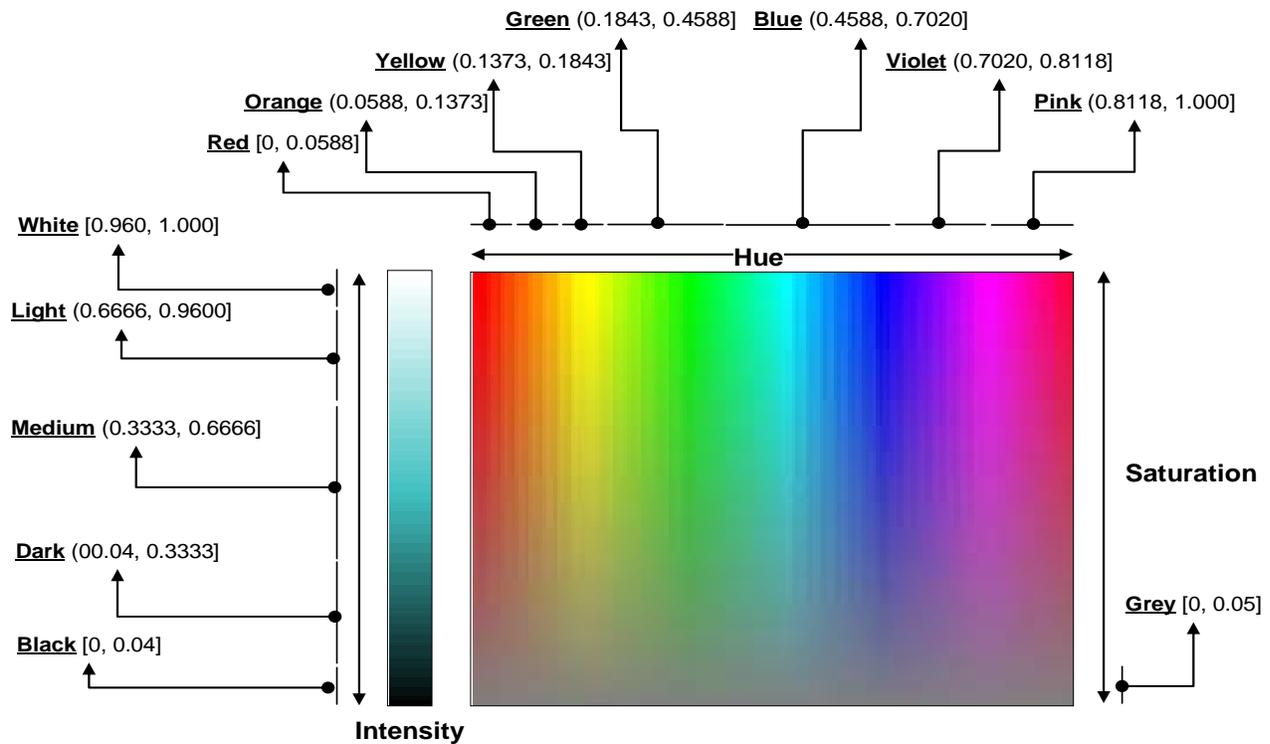


Figure 2 Heuristic Color Classification Model

```

ALGORITHM RegionColorTag( x_rgb )
{
    x_HSI = ConvertRGBtoHSI( x_RGB )
    h = HueComponent( x_HSI )
    s = SaturationComponent( x_HSI )
    i = IntensityComponent( x_HSI )
    hm = mode( h )
    sm = mode( s )
    im = mode( i )
    Define PrincipalColor as PC
    Define ColorIntensity as CI
    PC = LookupHueFromTable( hm )
    If im <= 0.04 Then
        CI = "Black"
        PC = ""
    ElseIf im >= 0.96 Then
        CI = "White"
        PC = ""
    ElseIf sm <= 0.05 Then
        CI = "Gray"
        PC = ""
    ElseIf im <= 0.333 Then
        CI = "Dark"
    ElseIf im <= 0.666 Then
        CI = "Medium"
    Else
        CI = "Light"
    End If
    Return Concatenate( CI, PC )
}
    
```

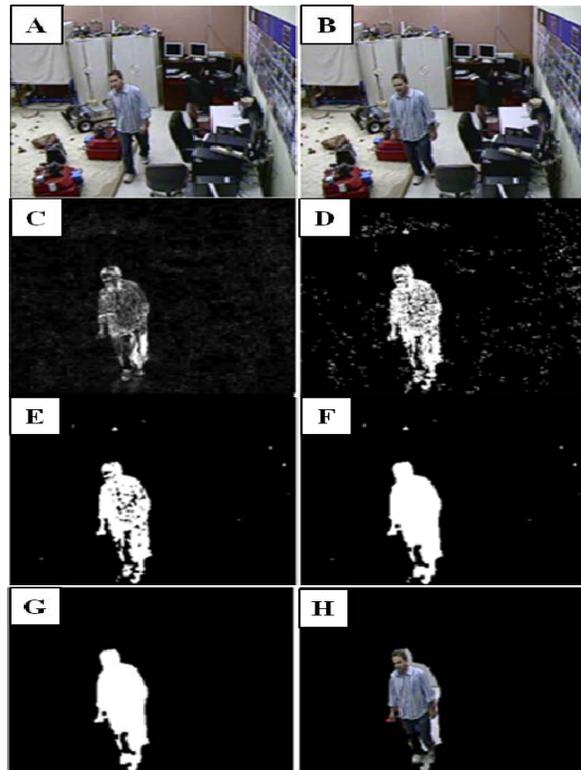


Figure 3 Experimental Results of Subject Extraction

Block-5&6: As mentioned earlier, the approach assumes that hard and soft agents are deployed in the security system. Typically, an event discovered by any agent need to be further supported by more evidences from other agents. In this work, our study is focused on characterizing the visual appearance of a subject in a compact form, so the human and machine agents can readily share, validate and support their observations. Block-7&8: Upon

receiving information from the different agents, the server analyzes it and performs decision making for dynamic resource allocation. In a typical scenario, sensors are configured to continuously monitor their designated zones in the environment looking for events of interest that have been defined and registered in the hypothesis database per the taxonomy and ontology of the application context. Upon positive detection of an event of interest, the client agents communicate this discovery to the server agent which in turn, evaluates the severity of the incident based on history and future impact of the incident and task the agents to deliberately and aggressively focus on high-value information that can expedite the sense-making of the situation. As an example, if a suspicious subject was discovered and more detailed information is needed, some other agents may be tasked to conduct a close-up characterization for the individual by zooming to head, upper body and lower body and do the color pattern analysis.

3.0 EXPERIMENTAL WORK AND RESULTS ANALYSIS

In this section, we present the preliminary experimental results conducted to illustrate the validity of the proposed approach. Figure 3 demonstrates an example of a sequence of image processing operations needed to extract a subject from a stationary scene background. These operations are: A: image frame at time ($t=t_0$), B: image frame at time ($t=t_1$), C: motion detection by applying the TDM model, D: image thresholding, E: median filtering, F: Morphological operators, G: object size filtering and H: image masking. As it can be observed, the subject extraction technique was reliable and effective as a first stage to segment and characterize the extracted subject. Figure 4 depicts the results from the CVIC proposed technique as follows: A: segmenting the extracted subject using the model in (1), B: analyzing the head color patterns as hair color and face color using the model in (2), C: color tag identification of the upper section and D: color tag identification of the lower section of the subject. The results were verified with their corresponding real tags and found to be very accurate.

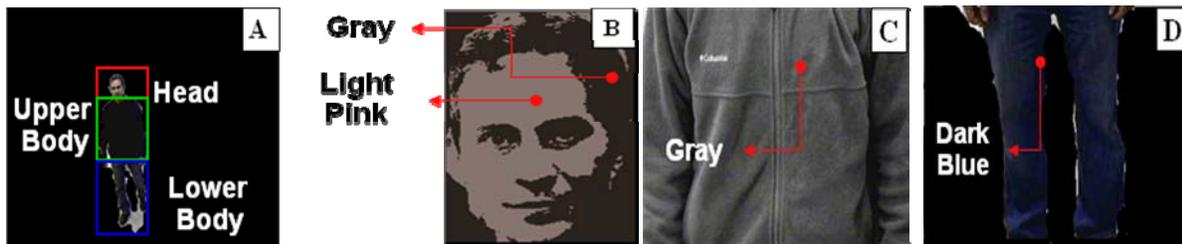


Figure 4 Experimental Results for Color Pattern Characterization

Another potential application for the proposed approach, semantic-based image archiving and retrieval. We conducted a several searches on google image base using their automated color-theme filter and tested 50 samples from google's results to compare our approach of CVIC with the google filter and our CVIC technique had a success rate of (46/50) that is 92%.

4.0 CONCLUSIONS AND FUTURE WORK

We have presented a new technique for color pattern characterization that is reliable for subject of interest visual appearance verification and in enhancing the information sharing among human and machine agents in networked video security systems. The CVIC technique is extendable to other areas of application such as semantic-based image archiving and retrieval. Both applications were experimentally tested and the preliminary results suggested that the CVIC technique is reliable and effective. We believe that our technique needs to be further evaluated with more extensive experimentation especially to compare its performance against human visual perception, but due to time limitation, we leave this work as a future work.

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SOME MODELS IN CALCULUS

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ABSTRACT

Differential and integral calculus are the products of many men. It is well known that differentiation of a function yields many concepts in every field such as physical sciences, social sciences, engineering, etc and the theory of integration is extended from real line to the plane and to the 3D space. In this paper, Firstly, we present a few results which center around the expression for the nth derivative of the product of any finite number of functions. Secondly, analytical integration formulas over 2 and 3 simplexes have been established.

Keywords and Phrases: Simplexes, closed formulas, differentiation under the integral sign.

(I) Analytical Results

Let $U_1(t), U_2(t), \dots, U_k(t)$ are all functions of 't' then we can find the successive differentiation or nth differentiation of the product: $U_1(t)U_2(t) \dots U_k(t)$ by using the multinomial theorem of algebra, thus it is the extension of the well known Leibnitz theorem in calculus. We shall give a statement of this extended formula in the following result.

Result (I): If $U_1(t), U_2(t), U_k(t)$ are functions of 't' whose nth derivative are known or can easily be found out, then the nth derivative of the product.

$U(t) = U_1(t) U_2(t) \dots U_k(t)$, then

$$\begin{aligned}
 D^n y &= \frac{d^n}{dt^n} \{u_1(t) \cdot u_2(t) \dots u_k(t)\} \\
 &= \sum_{n_1+n_2+\dots+n_k=n} \frac{n!}{n_1!n_2!\dots n_k!} a_1^{n_1} a_2^{n_2} \dots a_k^{n_k} \quad (1) \\
 &= (a_1+a_2+\dots+a_k)^n
 \end{aligned}$$

Where $a_i = u_i(t)$, $a_i^m = D^m u_i(t)$, $D^m = \frac{d^m}{dt^m}$ $l=1,2,\dots,k$; $m=0,1,2,\dots,n$

This can be proved by using the principle of the mathematical induction

Application example

Suppose we wish to find the derivatives of the product up to 3rd order:
 $u(t) = (at+b)^m \cdot \text{cost} \cdot e^{ct+d}$ (2)

Comparing with equation (1) we have,
 $k=3$; $0 \leq n_1+n_2+n_3 \leq 3$
 Hence, $D^3[u(t)] = D^3 [(at+b)^m \cdot \text{Cost} \cdot e^{ct+d}]$
 $= D^3 [u_1(t)u_2(t)u_3(t)]$

Now to find $\frac{du}{dt}$, $n_1+n_2+n_3=1$

$U_1 = (at+b)^m$
 $U_2 = \text{Cost}$
 $U_3 = e^{ct+d}$

1	0	0
0	1	0
0	0	1

$$= \sum_{n_1+n_2+n_3=1} \frac{n!}{n_1!n_2!n_3!} \cdot \frac{du_1}{dt^{n_1}} \cdot \frac{du_2}{dt^{n_2}} \cdot \frac{du_3}{dt^{n_3}} \quad (3)$$

$$= \frac{1!}{1!0!0!} [ma(at+b)^{m-1}] (\text{cost}) (e^{ct+d})$$

$$+ \frac{1!}{0!1!0!} (at+b)^m [-\text{sint}] (e^{ct+d}) + \frac{1!}{0!0!1!} (at+b)^m [\text{cost}] [\{c\} e^{ct+d}]$$

Similarly, we can find $\frac{d^2u}{dt^2}$ using the different combinations would be

$$0 \leq n_1+n_2+n_3 \leq 2,$$

2	0	0
1	1	0
0	2	0
1	0	1
0	1	1
0	2	2

And $\frac{d^3u}{dt^2}$, using $0 \leq n_1+n_2+n_3 \leq 3$, the combinations would be

3	0	0
2	1	0
1	2	0
0	3	0
2	0	1
1	1	1
0	2	1
1	0	2
0	1	2
0	0	3

Result (II): Let $\tilde{\sigma}_2 = \tilde{\sigma}_2(u) = \tilde{\sigma}_2(u_1, u_2)$ be the standard simplex in R^2 defined by the inequalities $u_1 \geq 0, u_2 \geq 0, u_1+u_2 \leq 1$ and the three vertices : $v_0=(0,0)$; $v_1=(1,0)$; $v_2=(0,1)$, then the integral over $\tilde{\sigma}_2 = \tilde{\sigma}_2(u) = \tilde{\sigma}_2(u_1, u_2)$ of the divergence of a vector function, $\hat{A} = \hat{i}_1 A_1(u) + \hat{i}_2 A_2(u)$ with $A_i(u)$, $i=1,2$ as scalar functions in 2 independent variables u_1, u_2 denoted by $I^2(\hat{A})$ can be expressed as:

$$I^2(\hat{A}) = \iint_{\sigma_2} \nabla_2 \cdot \hat{A} \, du_1 du_2$$

$$= \int_0^1 \sum_{i=1}^2 A_i(u_i, 1-u_i) \, du_1 - \int_0^1 A_1(0, u_2) \, du_2 - \int_0^1 A_2(u_1, 0) \, du_1$$

where $\nabla_2 = \hat{i}_1 \frac{\partial}{\partial u_1} + \hat{i}_2 \frac{\partial}{\partial u_2}$
and \hat{i}_1, \hat{i}_2 are the unit vectors in u_1, u_2 plane.

Proof: We have from left hand side of equation

$$I^2(\hat{A}) = \iint_{\sigma_2} \nabla_2 \cdot \hat{A} \, du_1 du_2 \tag{4}$$

$$= \int_0^1 \int_0^{1-u_1} \left[\hat{i}_1 \frac{\partial}{\partial u_1} + \hat{i}_2 \frac{\partial}{\partial u_2} \right] \cdot [(\hat{i}_1 A_1(u_1, u_2) + \hat{i}_2 A_2(u_1, u_2))] \, du_1 du_2$$

$$= \int_0^1 \int_0^{1-u_1} \left[\frac{\partial A_1(u_1, u_2)}{\partial u_1} + \frac{\partial A_2(u_1, u_2)}{\partial u_2} \right] \, du_1 du_2$$

$$= \int_0^1 \int_0^{1-u_1} \frac{\partial A_1(u_1, u_2)}{\partial u_1} \, du_1 du_2 + \int_0^1 [A_2(u_1, 1-u_1) - A_2(u_1, 0)] \, du_1 \tag{5}$$

To find a reduction factor to fist integral of equation (5), lets recall the well known result of differentiation under the integral sign (KAPLAN [2])

$$\frac{d}{dt} \int_{a(t)}^{b(t)} f(x,t) dx = f[b(t),t] b'(t) - f[a(t),t] a'(t) + \int_{a(t)}^{b(t)} \frac{\partial f}{\partial t}(x,t) dx \tag{6}$$

Using (6) we can write,

$$\int_0^1 \frac{\partial}{\partial u_1} \left(\int_0^{1-u_1} A_1(u_1, u_2) \, du_2 \right) \, du_1 = \int_0^1 -A_1(u_1, 1-u_1) + \int_0^{1-u_1} \frac{\partial A_1}{\partial u_1}(u_1, u_2) \, du_2 \, du_1 \tag{7}$$

From equation (7), we thus obtain,

$$\int_0^1 \int_0^{1-u_1} \frac{\partial A_1(u_1, u_2)}{\partial u_1} \, du_1 du_2 = \int_0^1 A_1(u_1, 1-u_1) \, du_1 - \int_0^1 A_1(0, u_1) \, du_2 \tag{8}$$

Substituting from [5], into equation [8], we obtain,

$$\int_0^1 \int_0^{1-u_1} \nabla_2 \cdot \hat{A} \, du_1 du_2 = \int_0^1 \sum_{i=1}^2 A_i(u_1, 1-u_1) \, du_1 - \int_0^1 A_1(0, u_1) \, du_2 - \int_0^1 A_1(u_1, 0) \, du_1$$

This completes the proof of the result

Result(III) : Let $\sigma_3 = \sigma_3(u) = \sigma_3(u_1, u_2, u_3)$ be the standard 3-simplexes in \mathbb{R}^3 space, in defined mathematically by the following inequalities:

$$u_1 \geq 0, u_2 \geq 0, u_3 \geq 0 ; u_1 + u_2 + u_3 \leq 1$$

Hence, the 4 vertices of the standard 3-simplexes have the co-ordinates:

$$V_0=(0,0,0), V_1=(1,0,0), V_2=(0,1,0), V_3=(0,0,1) \tag{9}$$

A closed formula for the integration of monomial over a standard simplex in 3D space is well known. Here, we give the formula with a simple proof, but the integrand is an expression of the

$$h_0 \, h_1 \, h_2 \, h_3$$

form: $u_0 \, u_1 \, u_2 \, u_3$.

Let us introduce for the sake of brevity, the notation $\Phi_2 = 1 - u_1 - u_2$, so that $u_3 = \Phi_2$, in the equation of the plane containing the points v_1, v_2, v_3 .

Let us consider the following integral over $\sigma_3 = \sigma_3(u)$, the standard n-simplex in \mathbb{R}^3 , denoted by

$$I_0(h_0, h_1, h_2, h_3) = \int_0^1 \int_0^{\Phi_1} \int_0^{\Phi_2} u_0 \, u_1 \, u_2 \, u_3 \, du_3 \, du_2 \, du_1 \tag{10}$$

Where $u_0 = 1 - u_1 - u_2 - u_3$

Then, equation [10] can be expressed as:

$$I_0(h_0, h_1, h_2, h_3) = \frac{\prod_{i=0}^3 h_i!}{\sum_{i=0}^3 h_i + 3}$$

CONCLUSIONS

The results we have presented in this paper are interesting for various reasons. We have developed a new and powerful technique to generalize the Leibnitz's theorem in its present form **Result (I)**. This has clearly demonstrated the use of multinomial theorem and Leibniz's theorem for the product of two functions. In order either to plan or control the static or dynamic behavior of models in CAD applications, it is often necessary to evaluate the integral properties of solid models, that is, area, volume, center of mass, moment of inertia and other geometrical properties of rigid homogeneous solids that are defined by triple integrals over domains of 3D Euclidean space. However, most of these applications are three dimensional in nature, interest in multidimensional modeling is growing.

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HOSTING RADIO FREQUENCY IDENTIFICATION (RFID) TECHNOLOGY IN THE CLOUD

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ABSTRACT

Radio Frequency Identification (RFID) uses radio waves to track the movement of goods through the Supply Chain system. The identity of an object is captured with a unique serial number that is transmitted wirelessly to a computer system. Small businesses are facing RFID implementation barriers. The barriers range from the perspective of the consumer-goods manufacturers and retail organizations. We propose implementing RFID technology using cloud computing framework to alleviate or reduce the implementation cost which is the most prevalent barrier.

INTRODUCTION

The Radio Frequency Identification (RFID) technology is an emerging valuable tool to automating identification and inventory management in supply chains. Radio frequency identification appears as a tag, containing the electronic product code (EPC) data including various details about the tagged product. Since the potential applications of RFID systems are numerous, especially in supply chain management, it is essential to address the industry and the consumer perspective issues and mandates that have resulted in barriers to RFID implementation.

This technology is being adopted widely for various applications worldwide and at the same time the technology has certain issues that are hindering its implementation in many organizations as well as its exponential growth. Secondly, expanded deployments of RFID systems in big organizations are taking place because of adoption of the RFID technology. As a result, more infrastructure (hardware and software), cost, services, and storage facilities are required. Additional barriers range from a lack of industry-wide standards, understanding of total costs, adoption of appropriate/necessary infrastructures to consumer privacy violation concerns. All leave organizations and consumers weary of the benefits and uses of the technology.

RFID can provide competitive advantage to retail organizations, yet purchasing such new technology, with the infrastructure costs of building out an RFID system, is a big investment, and in most cases, too large of a barrier to overcome (Gluckman, 2005). In order for retail organizations to implement a fully operating RFID system, they will need such technology components as tags and antennas, readers and networks, and networked databases. More specifically, small and mid-size organizations are disadvantaged significantly due to these barriers.

Cloud computing refers to computational resources that are accessible as on-demand services over the network. It may be broadly categorized as software-as-a-service, platform-as-a-service, and infrastructure-as-a-service (Napper and Bientinesi, 2009). The software-as-a-service (SaaS) which is also known as application-as-a-service includes the process of any application being delivered over the platform of the web to an end user, typically leveraging the application through a browser. It is based on the traditional timesharing model where many users shared one application and one computer (Dabas and Gupta, 2010). It leads to cost savings and risk reduction since a big amount of capital expenditures are eliminated which were required in the deployment of infrastructure or large-scale applications in-house (Napper and Bientinesi, 2009).

In this paper we outline the various barriers in implementing RFID technologies, and propose the implementation of RFID using Cloud Computing technology to mitigate the challenges posed by these barriers.

MOTIVATION

An RFID tag is a small and inexpensive microchip (like the size of a grain of salt) that emits an identifier in response to a query from a nearby reader. Once it is attached to an object, the small radio can send information specifically about the object to a computer network. The Electronic Product Code (EPC) is a unique number that identifies a specific item in the supply chain and it is this EPC that is stored on an RFID tag. Once the EPC is retrieved from the tag, it can be associated with dynamic data such as from where an item originated or the date of its production or its current location.

In 2003, Wal-Mart made it mandatory for its top 100 suppliers to put RFID tags on all cases (Juels, et al, 2003) and pallets that roll out of the manufacturer's base. The Department of Defense has ordered its suppliers to make all the supplies RFID enabled and Gillette has ordered at least 500 million of these. Michelin, which manufactures 80,000 tires a day, is planning to put RFID tags in each of its tires (Juels, et al, 2003). There is no law requiring a label indicating that an RFID chip is in a product; every item purchased with an RFID tag is "numbered, identified, catalogued and tracked."

Since many organizations require their vendors to supply RFID tagged products, the competitive race began so much that small and medium size companies could not cope or afford the cost and challenges of implementing full-fledged system of RFID. Thence, we propose that RFID technology be hosted in the cloud so as to enable small and medium size companies to subscribe to on-demand services or pay-as-you-go which will not be cost or capital intensive. This will help these companies to survive instead of being crushed.

BENEFITS OF RFID TECHNOLOGY IN BUSINESS

Due to its speed, range and durability, RFID has made a place for itself in high-end technologies and businesses, while the relatively cheaper and easy to use barcode is widely used in everyday applications, specifically by small and medium enterprise (SMEs). There are no tight controls on where an RFID tag should be positioned. Unlike barcode labels, which need to be read automatically and must adhere to standard positioning, the only requirement for the RFID tag is that it must be within the field of the reader and not blocked by metals or water. Additionally, the reader can read numerous tags at the same time. RFID tags provide robustness and security for asset, document and software tracking, but it doesn't have to stop there.

Companies are increasingly realizing the potential for RFID technology to be used in patient and people tracking, within the supply chain, in retail and in manufacturing; when used for tracking assets, RFID can greatly reduce the loss or misplacement of goods, minimize shrinkage and provide additional security for tagged items. Moreover, E pedigree, pharmaceutical, event ticketing and airline baggage tagging will also see business benefits.

Many organizations such as the U.S. Department of Defense, Toyota, Pfizer, Wal-Mart and a number of retail stores currently utilize RFID systems as part of their supply chain processes. Wal-Mart, in particular is often highlighted as an exemplary in the industry for their successful deployment of RFID technology in the early 2000's. RFID technology has significantly contributed to Wal-Mart's low cost strategy by allowing them to create an inventory control system that is highly efficient. Another retailer that has experienced a return on investment with respect to implementing an RFID system is American Apparel, a clothing retail chain headquartered in Los Angeles, CA. American Apparel boutiques regularly display over 26,000 Stock-Keeping Units (SKUs) which limits them to displaying a single article of clothing in a given color or style on the sales floor at a time. The use of RFID tags on all items coupled with handheld readers allows employees to determine which items are on the sales floor versus the stock room. This system has reduced the time that was traditionally spent dealing with inventory by more than 90%.

IMPLEMENTATION BARRIERS

Lack of Industry Standards

One main challenge organizations encounter with RFID implementations is lack of industry standard. Although the use of RFID technology is not new, only recently an industry-wide adoption of the technology is developing. Once retail organizations, like Wal-Mart, began requiring certain vendors to supply RFID tagged products, the race to become RFID compliant began, though, not without the issue that the mandates came before the standards were developed. Due to this, implementation has been hampered by high costs and unreliable hardware which has resulted in manufacturers and retailers being reluctant to invest heavily until worldwide standards are established.

According to Mohsen Attaran (2007), RFID technology faces implementation challenges such that implementing full-fledged systems in a large manufacturer can cost from \$13 million to \$23 million. Considering the sheer cost of RFID implementation, there is no ROI (Return On Investment) for the technology if you pursue compliance.

Industry leaders also believe that once core and next generation standards are developed, the costs related to RFID implementation will be greatly reduced and thus allow smaller organizations to realize the return on investments that are sought by the larger organizations. Those companies that have adopted a 'wait-and-see' approach due to lack of understanding and standards need a strategy to aid them in embracing and integrating the technologies. EPC global

and other standards approval organizations must thus work with the RFID ‘users’ to develop standards that are appropriate for organizations of different sizes and in different industries.

Consumer-Goods Suppliers and Manufacturers

Another barrier exists due to a basic lack of understanding of the approaches to integrating the technology into the existing IT infrastructure. Though commonalities among RFID implementations exist, it is specific to companies based on their size, industry, and relationships to other business. For example, a manufacturing company (supplier) that will be placing RFID tags on its products will have different implementation needs than the retail company that receives the tagged products. These consumer-goods manufacturers, initially will be most concerned about ‘how’ to efficiently modify their warehouses and production lines, and how to tag products and/or pallets with the RFID tags, while retail companies will initially be more concerned with processing the data received from the tagged products.

Manufacturing companies must implement the approach that best fits and will satisfy their business needs. Without a clear understanding of the different approaches to being RFID compliant, these organizations will remain resistant and not overcome barriers to implementing RFID technology into their business operations.

Retail Organizations

For retail organizations, the real value and return on investment of RFIDs comes from how the information derived from RFID tags and systems is applied to enterprise applications that control core business processes (inventory management, supply chain management, warehouse tracking, and location control applications) (Sullivan, 2005). To realize the benefits of RFID, retailers will need to upgrade their IT infrastructure in a number of areas, and their interfaces with other business will have to be closer. In addition, centralizing the above RFID functionalities and integrating them with legacy systems will require a new level of systems integration capabilities. With cloud computing, retailers will not need to upgrade their IT infrastructure.

Another problem is that, RFID creates huge volumes of data that are difficult to manage. According to an estimate, an RFID system can generate 10 – 100 times the data of conventional barcode systems, causing a huge increase in the daily volume of data on the corporate IT system. Recently, RFID retailers have made a great deal of noise about the massive hardware costs required to deal with mountains of data created by RFID systems (Winans, 2005).

PROPOSED RFID CLOUD COMPUTING IMPLEMENTATION

The focus of this paper is to attach the cloud computing mechanism to the existing RFID technology and thereby propose the RFID implementation using the cloud system to solve the aforementioned barriers. Meanwhile, we want to list few of the benefits many organizations are gaining by deploying cloud computing in their systems such as:

1. The cloud paradigm has the ability to offer new capabilities for every developer, but especially for those developers involved with implementing applications with the intensive demand of complex enterprise applications or high performance computing for science or research projects.
2. There are many benefits for cloud computing. In fact, many companies use it, including Amazon, Yahoo, Google, Zoho, Microsoft and Salesforce. This is becoming the norm in computing and software deployment. It helps keep the cost down for both the users and website owners. Also for the users, they can access it from any computer and still have the file they need. For the owners, they do not need to reproduce the software and ship it out. They just rent the server space.
3. Likewise, IBM has introduced the IBM Smart Business Development and Test on the IBM Cloud. That service is designed to provide developers with a secure, cloud-based enterprise-class development and test environment, thus offering them the ability to create and test very large enterprise-scale applications without the acquiring, configuring, or maintaining the hardware needed. And that’s an important point. When asked to identify the top benefit of deploying applications in a public cloud the most cited were: freedom from maintaining hardware (19.9%), cost savings (19.4%), and scalability (16.4%). If we look just at those developers in large companies (having more than 1000 employees), the results are the same, though there is less emphasis on scalability.

4. **Scalability:** IT departments that anticipate an enormous uptick in user load need not scramble to secure additional hardware and software with cloud computing. Instead, an organization can add and subtract capacity as its network load dictates. Better yet, because cloud-computing follows a utility model in which service costs are based on consumption, companies pay for only what they use.
5. As the technology is highly scalable (load balancing, hardware upgrades, etc), website expansion can be done with minimum limitations. Think about the hassle of migrating your website from a shared server to a dedicated server; think about server crash when your website experienced a sudden surge – all these problem can be avoided easily by switching to cloud hosting.

So, there are plenty of benefits working with cloud computing. Cloud computing is still growing and many government bodies and company organizations already use this type of network for their businesses. This type of computing allows them to focus on what matters and not to worry about technology side of things.

COST SOLUTION USING RFID CLOUD COMPUTING IMPLEMENTATION

Since, cost was one of the barriers in implementing RFID, now with the cloud computing, clients will be able to use the RFID technology based on-demand thereby paying small amount of fees as needed. This goes a long way to alleviate the burden of investing huge amount of money in the new infrastructure.

Take for instance, many business application software vendors are pushing for the use of the hosted software model for Small and Medium size Enterprises (SMEs). The goal is to help customers acquire, use, and benefit from the new technology while avoiding much of the associated complexity and high start-up costs (Stair and Reynolds, 2010). Many software producing giants like Microsoft, Oracle, NetSuite, etc, are among the software vendors who offer hosted version of their Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM) software at a cost of \$50 - \$200 per month per user (Nichols, 2008). This pay-as-you-go approach is appealing to SMEs because they can experiment with powerful software capabilities without making a major financial investment. Organizations can then dispose of the software without large investments if the software fails to provide value or otherwise misses expectations.

By the same token, RFID can be hosted in the cloud to enable its usage by small and medium size organizations or any organization that cannot afford the cost of implementing the entire technology. Since the RFID implementation has been hampered by high costs and unreliable hardware which resulted in many organizations (manufacturers and retailers) being reluctant to invest heavily in the technology, the pay-as-you-go approach and/or the on-demand services approach will enable them believe that the maturity level of RFID is enough to deliver a return on their investments.

STORAGE SOLUTION USING RFID CLOUD COMPUTING IMPLEMENTATION

As stated above, one of the implementation problems is that RFID creates huge volume of data that makes it difficult for organizations to manage. But, on the cloud, the RFID data is semantically filtered according to a specific application of need, use its relative platform and infrastructure over the network and then stored on a specific server. Middleware and protocols are used in the cloud computing system here. A server administers the system and traffic. The middleware and protocols allow the networked resources to communicate with each other. The cloud computing systems has a lot of storage space which it requires to keep all its RFID systems clients' information stored. It makes a copy of all the RFID information and stores it, (Dabas and Gupta, 2010).

Also, one of the biggest advantages associated with cloud computing as a web hosting solution is the idea of *elastic capacity*. Demand for more bandwidth and disk space is always elastic, either up or down. As the demand increases, it is necessary to have more server resources at your disposal. As it decreases, paying for those unused storage resources could be an unwanted burden. In order to have a web site capable of dealing with high traffic spikes, you need to ensure that there are enough server resources to handle the influx. When web traffic has ebbed, you will maintain better profitability if you are not having to pay for those additional resources you needed during the spikes. Rarely does any website have a constant level of increasing spikes.

That notwithstanding, cloud computing (depending on the provider and the plan chosen) charges for an amount per gigabyte of transfer and per web site request. The pricing is very straightforward and easy to understand for the most part. This pricing structure helps define cloud computing as a "pay as you go" plan, allowing one to be able to harness as much or as little server resources as are necessary. This elasticity for meeting traffic demand is one of the biggest distinguishing characteristic of cloud computing. While the market is dominated by a select few number of players currently, it is poised for RFID to become more popular, with several well-known traditional hosting centers to offer cloud based solutions.

In general, cloud computing provides computing service that is scalable and virtualized and reduces the capital cost of IT by converting capital expense into operating expense. It is web based. Another advantage frequently discussed regarding cloud computing is the better stability that such plans usually come with. Since the cloud is interconnected, there are many different instances for redundancy. This redundancy and the associated scale make cloud computing quite stable. Very rarely is there a problem and even when one arises, it's usually quickly resolved. This significant increase in the level of stability means that you can have more piece of mind about whether your website and online applications are up and running. This type of service is what the organizations using RFID technology need.

CONCLUSION

In this paper, we propose the implementation of RFID technology using the cloud computing system which provides on-demand services and pay-as-you-go system. This appeals to Small and Medium size Enterprises (SMEs) because they can now use such powerful RFID capabilities without making a major financial investment. Cost being the major barrier in implementing RFID by many organizations, with cloud computing system as well as consumer acceptance issues as drivers, these organizations will now gain competitive values in the supply chain system and the barriers discussed in this paper can be mitigated and circumvented.

In the absence of addressing the cloud computing issues, other successful implementation and acceptance of RFID technologies will continue to prevent companies from achieving the ROI that the technology promises. In addition, without the elimination of these barriers, new innovations that RFID technology can bring, will not be realized.

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BAYESIAN CLASSIFIER FOR AGRICULTURAL DATA-MINE

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ABSTRACT

Data mining occupies a prominent place for the researchers engaged in various fields such as agriculture, economics and optimization etc. Data mining provides us decisive information upon sifting and churning out of the data given. Randomly unbiased samples are drawn from the cross sectional population area in order to discover the pattern of the data. In this paper, we attempt to efficiently classify the profitable and non-profitable agricultural crops' combinations for the Indian farmers by developing Bayesian classifier and its algorithm.

Keywords: Naïve Bayes Classifier / Computing Algorithm / C++ / Agricultural data mine

1. INTRODUCTION

Data mining is one of the promising areas of research in physical as well as extension sciences. Data mining refers to the process of extracting patterns from data and in turn it supplies decisive information to take effective and efficient decisions to the problems arising out of various fields of marketing, surveillance, agriculture and optimization etc. Data mining can be used to uncover patterns in data but is often carried out only on samples of data. The mining process will be ineffective if the samples are not a good representation of the larger body of data. Data mining cannot discover patterns that may be present in the larger body of data if those patterns are not present in the sample which is being mined. Inability to find patterns may become a cause for some disputes between customers and service providers. Therefore, data mining is not fool proof but may be useful if sufficiently representative data samples are collected. The discovery of a particular pattern in a particular set of data does not necessarily mean that a pattern is found elsewhere in the larger data from which that sample was drawn. Therefore, a verification and validation of patterns on other samples of data is a must (Cabena et.al. 1997, Edelstein & Herbert, 1999).

Today, India ranks second worldwide in farm output. Agriculture and allied sectors like forestry and despite a steady decline of its share in the GDP, is still the largest economic sector and plays a significant role in the overall socio-economic development of India. India is the largest producer in the world of milk, cashew nuts, coconuts, tea, ginger, turmeric and black pepper. It also has the world's largest cattle population (281 million). It is the second largest producer of wheat, rice, sugar, groundnut and inland fish. It is the third largest producer of tobacco. India accounts for ten percent of the world fruit production with first rank in the production of banana and sapota. In this way, in the history of agricultural development, India has a long history dating back to ten thousand years (Agriculture Indo British Network, 2007; Indian Agri Info Centre, 2008).

Slow agricultural growth is a concern for policymakers as some two-thirds of India's people depend on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and India's yields for many agricultural commodities are low. Illiteracy, general socio-economic backwardness, slow progress in implementing land reforms and inadequate or inefficient finance and marketing services for farm produce are some of important factors of low productivity in the field of agriculture. Inconsistent government policy, agricultural subsidies and taxes often changed without notice for short term political ends, the average size of land holdings which comes out to be very small are serious issues for unsatisfactory growth. Adoption of modern agricultural practices and use of technology are inadequate, and it is further hampered by ignorance of such practices. High costs and impracticality in the case of small land holdings, inadequate irrigation facilities, erratic fluctuation of Monsoon and insufficient and irregular power supply are areas of our weaknesses in this field (Word Bank Report, 2008).

Cropping associations are distinguishing features of agriculture for different parts of our country. In northern India, there are two distinct seasons, **kharif** (July to October), and **rabi** (October to March). Crops grown between March

and June are known as **zaid**. Of late, the trend is even more than two crops (multiple-cropping) in a year. These intensive croppings may be done either in sequence or even there may be relay-cropping-one crop undersown in a standing crop. With wide-rowed slow growing cropping patterns, companion crops may be grown. There are various ways of utilizing the land intensively. The chosen crops must be combined in a special way (rotations) in the farming systems; as to which of the crops, now remaining on the list, are most profitable (or yield most food in a subsistence agriculture). In what combinations and at what level of input application would they make the best use of local land, climate and input resources in short-term and long-term situations bearing in mind the degree of food and income security required by the individual farmer and the community. As to what operational factors rule out or amend the size and the method of any of the economically preferable crop combinations thereof; and finally, are the crop combinations, the farming systems and the input levels suggested by this process of the individual farmers compatible with their own skills, enterprise preferences, health, age and capital. All these factors have led to the present cropping patterns, which are getting more and more intensive both in respect of the number of crops grown per year and in respect of the intensity of inputs utilized in the production of these crops (Sengupta, 2008; Sankaran, 2006). Soil classification was attempted to determine a relationship or correlation that can be established with soil data set. Data mining techniques, when applied to an agricultural soil profile, may improve the verification of valid soil profile classification by using the Bayesian Classifier without dividing the population in mutually exclusive ways (Bhargavi and Jyothi, 2009). A Computational Approach to Bayesian Stochastic Classifier has been attempted for merchantable material (Mishra, 2010). Likewise, crop combination plays a significant role in the agricultural system which needs to be restrengthened and reinvestigated to figure out new paths and direction for Indian Agricultural System.

In this paper, an attempt has been made to sift out the agricultural information in order to efficiently classify the significantly profitable crop-combination and normally profitable crop-combination by suggesting data mining technique of Bayesian classifier and developing its computing algorithm which can be useful for agricultural system as a valid and scientific apparatus for their decision making.

2. MATERIAL AND METHODS

Classifier of datamining begins with supervised and unsupervised techniques. Supervised learning is a machine learning technique for deducing a functional relation from training data which is based on posteriori knowledge i.e. past experience. Association function in between wheat and gram, masoor and mustard, corn and cocumber is sought from the past information of the data. Supervised algorithms require a posteriori knowledge and experience with the data. Classification and decision trees are examples of this approach and can be used to verify a hypothesis. Unsupervised learning or priori techniques do not need knowledge. They discover relations by their own. Clustering is used to detect similarities a priori. A priori algorithm is fundamental for data mining. Such statistical approaches usually lag the ability to detect non-linear relations but provide understandable results (decision trees). New advances in artificial intelligence like neural networks and genetic algorithms support the pattern recognition process to find non-linear relations. A training set is a set of data used in various areas of information science to discover potentially predictive relationships (fig. 2.1). Training sets are used in artificial intelligence, machine learning, genetic programming, intelligent systems, and statistics. In all these fields, a training set has much the same role and is often used in conjunction with a test set. In general, an intelligent system consists of a function taking one or more arguments and results in an output vector, and the learning method's task is to run the system once with the input. A test set is a set of data used in various areas of information science to assess the strength and utility of a predictive relationship (fig. 2.1). Test sets are used in artificial intelligence, machine learning, genetic programming, intelligent systems, and statistics. In all these fields, a test set has much the same role. Many procedures have been developed to search through large collections of data for potentially useful or interesting relationships (Han & Micheline, 2000; Poncelet et.al., 2007).

For example, regression analysis was one of the earliest such approaches to be developed. The data used to construct or discover a predictive relationship are called the training data set. Most approaches that search through training data for empirical relationships tend to overfit the data, meaning that they can identify apparent relationships in the training data that do not hold in general. A test set is a set of data that is independent of the training data, but that follows the same probability distribution as the training data. If a model fit to the training set also fits the test set well, minimal overfitting has taken place. If the model fits the training set much better than it fits the test set, overfitting is likely the cause (Apte, et.al. 1999; Caruana and Niculescu 2006).

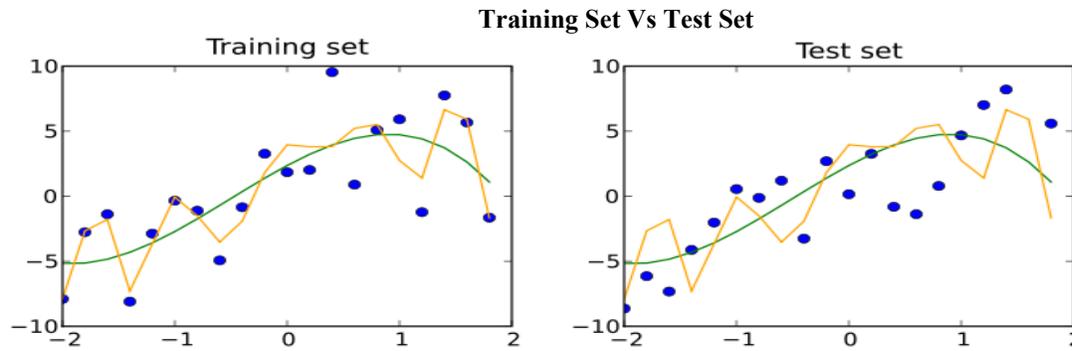


Fig. 2.1

Main algorithms in the field of data mining (Hastie, 2001) follows: regression algorithm which gives us conditional prediction of response variable for the value of predictors and classifying algorithm that makes mutually exclusive groups, for example significantly and normally profitable articles. A Bayes classifier (Harry, 2004) is a simple probabilistic classifier model which is based on Bayes Theorem, supervised learning, maximum likelihood, training set and test set. This is also called the independent feature model. A naive Bayes classifier assumes that the presence (or absence) of a particular feature of a class is unrelated to the presence (or absence) of any other feature. For example, a fruit may be considered to be an apple if it is red, round, and about 4” in diameter. Even though these features depend on the existence of the other features, a naive Bayes classifier considers all of these properties to independently contribute to the probability that this fruit is an apple. An advantage of the naive Bayes classifier is that it requires a small amount of training data to estimate the parameters (means and variances of the variables) necessary for classification. Because independent variables are assumed, only the variances of the variables for each class need to be determined and not the entire covariance matrix (Kantardzic, 2003).

3. Construction of classifier and Computing Algorithm

A probability model for a classifier is a conditional model

$$p(C|F_1, \dots, F_n)$$

over a dependent class variable C with a small number of outcomes or *classes*, conditional on several feature variables F_1 through F_n . The problem is that if the number of features n is large or when a feature can take on a large number of values, then basing such a model on probability tables is infeasible. We therefore reformulate the model to make it more tractable. Using Bayes’ theorem, we write

$$p(C|F_1, \dots, F_n) = \frac{p(C) p(F_1, \dots, F_n|C)}{p(F_1, \dots, F_n)}$$

In plain English the equation can be written as

$$\text{posterior} = \frac{\text{prior} \times \text{likelihood}}{\text{evidence}}$$

Now the “naive” conditional independence assumptions come into play: assume that each feature F_i is conditionally independent of every other feature F_j for $j \neq i$. This means that

$$p(F_i|C, F_j) = p(F_i|C)$$

The discussion so far has derived the independent feature model, that is, the naive Bayes probability model. The naive Bayes classifier combines this model with a decision rule. One common rule is to pick the hypothesis that is most probable; this is known as the maximum a posteriori or MAP decision rule. The corresponding classifier is the function classify defined as follows:

$$\text{classify}(f_1, \dots, f_n) = \underset{c}{\operatorname{argmax}} p(C = c) \prod_{i=1}^n p(F_i = f_i|C = c).$$

In this section, we will discuss the the problem of the cropping combinations which may be classified for significant profit and normal profit by suggesting various crop combinations. Let the size of crop combinations in the population be $2M$. Let the population be divided in two parts each having size M . A training set of size m (say) is randomly selected from half of the population of size M and test set is selected from remaining population of size M . Now we

aim to segregate the size m (size of unbiased sample from training set) in two mutually exclusive classes based on its features. One is of significantly profitable crop combination (SPCC) and another is of normally profitable crop combination (NPCC).

For example, let sample size be 5 say x_1, x_2, x_3, x_4, x_5 in which mutually exclusive CCs occur in a specified order (particular case) as:

$x_1 \rightarrow$ SPCC, $x_2 \rightarrow$ NPCC, $x_3 \rightarrow$ SPCC, $x_4 \rightarrow$ SPCC, $x_5 \rightarrow$ NPCC

CC may be defined as $CC = \langle m_1, m_2, m_3 \rangle = \langle m_i, i=1,2,3 \rangle = \langle \text{wheat, mustard and gram} \rangle$ (say)

Consider the problem of classifying combinations by their features, for example into significantly profitable and normally profitable combinations. Suppose that crops are drawn from a number of classes of CCs which can be modelled as sets of crops where the (independent) probability that the i -th crop of a given CC occurs in a class C of CCs can be written as

$$p(m_i / C)$$

(For this treatment, we simplify things further by assuming that items are randomly distributed in the class- that is, crops are not dependent on the feature)

Then the probability of a given CC, given a class C , is $p(CC / C) = \prod_i (m_i / C)$. Now by definition,

$$p(CC / C) = \frac{p(CC \cap C)}{p(C)} \text{ and } p(C / CC) = \frac{p(CC \cap C)}{p(CC)}$$

Bayes' theorem manipulates these into a statement of probability in terms of likelihood.

$$p(C / CC) = \frac{p(C)}{p(CC)} p(CC / C)$$

Assume for the moment that there are only two mutually exclusive classes, significantly profitable and normally profitable SPCC and NPCC respectively such that every element (crop) is in either one or the other as:

$$p(CC / SPCC) = \prod_i (m_i / SPCC) \text{ and } p(CC / NPCC) = \prod_i (m_j / NPCC),$$

where $m_i + m_j = m$

Using the above Bayesian result, we can write:

$$p(SPCC / CC) = \frac{p(SPCC)}{p(CC)} \prod_i (m_i / SPCC)$$

$$p(NPCC / CC) = \frac{p(NPCC)}{p(CC)} \prod_i (m_j / NPCC)$$

Dividing one by the other gives:

$$\frac{p(SPCC / CC)}{p(NPCC / CC)} = \frac{p(SPCC)}{p(NPCC)} \frac{\prod_i (m_i / SPCC)}{\prod_i (m_j / NPCC)}$$

Finally, the combination can be classified as follows. It is significantly profitable if $\ln \frac{p(SPCC / CC)}{p(NPCC / CC)} > 0$ (a

proposition that crop combination chosen is significantly profitable is accepted), otherwise it is normally profitable combination for the farmers and proposition floated is rejected (table 3.1).

3.1. Computing Algorithm and Numerical Demonstration

We use the following computing algorithm to numerically demonstrate the model's finding (Mishra, 2009; Nisbet et.al., 2009).

- Begin
- Input
- $x \leftarrow$ Compute Prob (SPCC)
- $y \leftarrow$ Compute Prob (NPCC)
- $z \leftarrow x/y$
- $x_1 \leftarrow$ Compute LKH(SPCC)
- $y_1 \leftarrow$ Compute LKH(NPCC)
- $z_1 \leftarrow x_1/y_1$

- $z2 \leftarrow z * z1$
- if $z2 > 0$
- SPCC
- Else
- NPCC
- Output
- End

Let m_i in CC follows the binomial distribution for m_i and CC both are finite, then $B(m_i, M) = m_{Cmi} p^m_i q^{m-m}_i, m_i + m_j = m, i \neq j$

Further, we assume that the combinations chosen from the entire class of combinations are significantly profitable. Now, by using the above computing algorithm and implementing in C++ for a particular data simulation (hypothetical), we can easily compute

$$L(\text{SPCC}) = 3^{15} / 2^{10} \times 5^5 \text{ and } L(\text{NPCC}) = 2^{15} / 3^{10} \times 5^5, p(\text{SPCC})=3/5, p(\text{NPCC})=2/5$$

This implies that $\text{Ln}(\text{probability ratio}) > 0$. This testing based on the log-likelihood ratio provides sufficient scientific evidence to accept the proposition of the problem i.e. significantly profitable combination of crops.

Summary of the Result

CC	Ln(Ratio)	Result
CC1	Positive	Accepted
CC2		
CC3	Negative	Rejected
CC4		

(Table 3.1)

CC=Crop Combination, CC1=First Crop Combination, CC2=Second Crop Combination, CC3=Third Crop Combination, CC4=Fourth Crop Combination (For example, CC1= Wheat & Mustard, CC2=Wheat & Gram; CC3=Wheat & Masoor, CC4=Wheat & Mustard)

4. Discussion and Conclusion

Any applicational discussion is not believed to culminate the justification unless it is corroborated by any scientific footing. Bayes classifier provides the decision making tool to segregate the significantly and normally profitable crop combinations. Naive Bayes classifiers have worked quite well in many complex real-world situations. A comprehensive comparison with other classification methods showed that Bayes classification is outperformed by more current approaches, such as boosted trees or random forests. It is common for the data mining algorithms to find patterns in the training set which are not present in the general data set, this is called over fitting. The evaluation for removing its problem uses a test set of data on which the data mining algorithm was not trained. The learnt patterns are applied to this test set and the resulting output is compared to the desired output. In the present paper, a data mining algorithm trying to distinguish profitable combinations would be trained on a training set of sample crops. Once trained, the learnt patterns would be applied to the test set of combinations which it had not been trained on; the accuracy of these patterns can then be measured from how many crops they correctly classify. ROC is a powerful method to evaluate this system of algorithm. After learning the present pattern of the system, it is found that it is conforming to the desired result it is now the final step to interpret the learnt patterns and turn them into knowledge. If the learnt patterns do not meet the desired standards, then it is necessary to reevaluate and change the preprocessing and data mining. In this way, the paper is assumed to dwell upon the basic issue related to the agricultural system in general and Indian system in particular in a conceptual framework which further needs to be developed in more realistic way in the form of some case study as a future research work.

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Brief CV of Dr S S Mishra

Dr Sant Sharan Mishra earned his M.Sc., Ph.D. degree in Mathematics & Statistics and D.Sc. Degree in the field of “Operations Research & Computing” from Dr. Ram Manohar Lohia Avadh University, Faizabad, UP, India. Presently, he is serving as Reader/Assoc. Professor in the Dept. of Mathematics and Statistics, Dr Ram Manohar Lohia, Avadh University, Faizabad, UP, India.

His current research interests include Numerical and Statistical Computing, Operations Research, Bio-Informatics, Supply Chain Networking and Applied Economics etc. To his credit, he has 46 research papers published in national and international journals of



repute. Under young scientist category, he received a best research paper award from VPI in 1998 and a SERC visiting fellowship in O.R. from the Department of Science and Technology, Govt. of India. Also supervised as Principal Investigator two research projects (one in India and another in abroad) and 10 Ph.Ds. in the area of O.R. and Computing.

Selected and worked as an Associate Professor under the scheme of World Bank/UNDP during 2003-2005 in the Department of Applied Mathematics at Debub University, Ethiopia, N-East Africa. Also served as a Mathematical Reviewer of American Mathematical Society (since 2004), Computers and Mathematics with Applications, Elsevier Ltd in the areas of Numerical and Statistical Computing and Operations Research. Dr Mishra has also availed two copy rights for his research techniques (software) from Ministry of Human Resource, Govt. of India.

And was also invited (with grant fellowship) to present his talk on cost analysis of machine interference model by International Congress on Industrial and Applicable Mathematics 2007 at Zurich University, Switzerland. He was also invited to present his talk in the field of Econo-operations Research in the International Conference ENEC08 at Hyperion University, Romania in May 2008, 2009 and 2010. He has also served as a guest Editor of International Journal of Applied Mathematics and Computer Science (Special Issue on Operations Research and Computers), Winter Issue 2009 published by World Academy of Science and Technology.

Also invited for the interaction meet with Nobel Prize Winners at Indian Institute of Information Technology Allahabad, UP, India sponsored by Department of Science and Technology, Govt of India 2009. Also, he is an active member of American Mathematical Society USA, Europe-India Grid, Operations Research Society of India and Industrial and Applied Mathematical Society of India etc.

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