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EIS Based on Garbage-In Garbage-Out [GIGO] Philosophy

Dr. Subodh Kesharwani
Editor-In-Chief
1st July 2011

Editor's Message

After Making a GJEIS Quarterly [4 Times in a Year] from the 2011 onwards, we are receiving an overwhelming response from the viewer as well as the contributors. The backbone of a GJEIS is there authors who had contributed a lot by their thought provoking views and hard-core research write-ups.

Editorial office salutes them for their hard work and effort taken, nonetheless a reviewer/ editorials that had reviewed/commented and finally given their valuable comments to enhance the text, should also be acknowledged for the same. They are in real sense a great artist after an author as they provide different ways to polish and furnish a final shape by their proficiency and direction.

There is an old saying called "Garbage In, Garbage Out" This saying was coined by George Fuechsel an IBM hack. Other such terms like FUBAR, SNAFU, and even KIBO reflect some of the issues as a whole.

The mandate behind choosing the theme "GIGO" relies in that only. We know that how GIGO Philosophy had facilitate computers in the past and make people aware that whatever the data inputted, the output will be available in that respect. Thus One has to be very cautious in putting DATA so that Right information comes in the form of Finished Product. EIS up to some extent based on this philosophy too, that the software is very gigantic and results are huge so that proper care should be taken to put accurate information and streamlining data.

I once again appreciative for all the support and attempt to equip GJEIS to enormous height and thicken into information based archive in order to promote academia and industry in total.

Thanks

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Fostering the Garment Industry Competitiveness: *The ICT Contribution*

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ABSTRACT

The paper addresses a new holistic organization paradigm along the garment value chain, covering the main advanced technology innovation solutions at the aim to foster industry sustainability and competitiveness. The proposed manufacturing system will allow the garment industry to fully satisfy the final customer requirements in terms of functionality, comfort and fashion while increasing industry sustainability and competitiveness through its implications in terms of productivity, time to market and wastes reduction.

The framework and the method developed for garment industry is presented and two ICT based innovative solutions regarding product tracking and virtual prototyping are analysed.

KEYWORDS

Garment Industry	Competitiveness
Sustainability	Supply chain management [SCM]
ICT	Technology innovation
Competitiveness	

PREAMBLE

"… In future, winning companies will be the ones able to connect with consumers and optimise their in-store experience thanks to an integrated business and product planning. The latter should speed-up design and development while integrating sourcing, supply and logistic partners with the aim of improving companies service strategies and create unique flow paths" (Mrs Ern-Stockum - Managing Director, Kurt Salmon).

"… (the) experience has shown that, when suppliers and retailers cooperate, exchange information on stock levels and sales and, more generally, create solid and long-lasting relationships as business partners, both parties can achieve much better results than if they deal with each other merely as suppliers and buyers." (Mr. Massoletti - AEDT Vice-President)

These two considerations emerged during the recent European Apparel and Textile Confederation (EURATEX) annual general assembly well summarize the European industrial approach to the hypercompetition (D'Aveni, 1994) characterizing the garment industry and underline the relevance and the future expectations for ICT technology applications into the garment supply chain.
The garment industry has been subject to different reconfiguration processes to adapt itself to the changing political, environmental, economic and competitive factors. Old economic trends have been added recently by newer globalisation trends which affect deeply the apparel supply chain modifying its configuration and intensifying the industry competitive pressure (Cepolina & Scarsi, 2011). The emerging garment value chain is high disperse and is composed by numerous different players all over the world. In these globally networked organizations, a firm's competitive advantage lies not so much in being "the best", but in its ability to co-create with others and to orchestrate this process of co-creation in the most efficient, effective (Daiser, 2009) and sustainable way. At this aim enterprises have to develop new competencies and capabilities.

Emerging concepts of garments as made-to-measure fashion items or technical clothes like protective equipment, medical appliance, wearable computer etc. require a reconfiguration of the overall customer-vendor relationships, a paradigm change in customer service and customer relationship management with a focus on value-adding product-services and sustainability (Binder, Janicke & Petschow, 2001). In other words new management of product complexity, new attention should be paid to customisation and personalisation taking into account sustainability issues like: resources sparing, environment protection, and cleaner utilisation, waste re-cycling. This situation criticality looks for new policies in the market of products, to lower tangibles spoilage, by value-chain paradigms turned on intangibles. This paper addresses appropriate management concepts building on knowledge and technological tools integrated within a seamless common architecture, purposely developed for benefitting this industry. The proposed framework - the Extended Smart Sustainable Organization (xSSO) – is suggested to become the new networking oriented, integrative framework for the organization of flexible garment manufacturing of the future (Abernathy, Volpe & Weil, 2006).

THEORICAL FRAMEWORK

Smart Organization

The organization is knowledge-driven, internetworked, dynamically adaptive to new organizational forms and practices, learning and able to create and exploit the opportunities offered by the new economy (Abernathy, Volpe & Weil, 2006).

The idea that today all companies are more or less working in networks of various types leads to some implications (Filos & Banahan, 2000). To work effective in communities a company has to change its understanding about its environment: the organization should recognise the value of partner contribution and use it for the wellbeing of the community; the organization should not seek to control its environment but recognise that any such attempt would at best, fail, and at worst, stifle the creativity and imagination necessary to support innovation (Matheson & Matheson, 1998); the organization should realise that trust is a key issue in determining the success of relationships in the digital economy (Camarinha-Matos, Afsarmanesh & Erbe, 2000) and seeks to prove it, in the way it interacts.

To achieve this new understanding, companies need collaborative and networking competencies (Grant, 1996; Lorenzoni & Lipparini, 1999). These

competencies can be reached by the evolution of the companies in the field of ICT networking, organizational networking and knowledge networking.

Sustainable Organization

The sustainability is becoming urgent demand. The World Commission for Environment and Development (WCED) clearly stated the new economic paradigms for sustainable development, which meets the needs of the present population without compromising the needs of future generations (Carr, 2001).
Sustainable organization introduces constraints aimed at - lowering material and energy depletion intensity (at production, use and dismissal); - avoiding toxic dispersion and lower pollution; - enhancing using renewable resources and re-using of exhausted tangibles; - increasing the service intensity (by artefacts sharing, by functions dispensing, etc.); - increasing recycling efficiency, with profitability of the new business aiming at the tangibles reverse logistics (from waste, to 'raw' materials); increasing energy efficiency (World Commission on Environment and Development, 1987). Company's competitiveness will turn towards the ability of offering to the customer expected product functions with proper satisfaction and non-renewable resource balance.
xSSO concept is based on research work developed within the Leapfrog European research project. The concept, there developed by the technical and scientific perspectives, is here enriched with the sustainability component and it is faced by the managerial perspective with attention to its implications in terms of firms' competitiveness. Technical aspects are briefly introduced to show system functionalities and any further information can be found in (Walter, Kartsounis & Carosio, 2009).

XSSO FRAMEWORK

The xSSO concept is based on different theories coming from numerous research fields (smart organization, ICT, knowledge management, relationship marketing and cluster analysis, supply chain management and innovation management (Nonaka, 1991; Pilat, 2004; Handfield & Nochols, 1999; Chopra & Meindel, 2003; Shapiro, 2001; Gronros, 1987; Gummeson, 1987; Hakansson, 1979; Kang & Kang, 2009; Gupta, Raj & Wilemon, 1986; Chesbrough, 2003) offering an original, holistic and new integration framework able to support strategic behaviour of enterprises operating in the sector. Each company could query the software and receive different options to improve its competitive positioning. The options could refer to many firm's areas, like: logistics, quality system, supply chain management, networking etc.. The enterprise will adopt and include in its own xSSO the options considered most relevant and coherent with its corporate strategy (Cepolina, 2011).

The application of the xSSO concept is aimed to modernise and transform the garment sector into a flexible knowledge-driven sustainable high-tech industry by:

- ✓ a leap in productivity and cost efficiency in the garment manufacturing process,
- ✓ a radical move towards rapid customised manufacturing,
- ✓ a coherent life cycle sustainability assessment and
- ✓ a paradigm change in customer service and customer relationship management with a focus on value-adding product-services.

The integration of all innovations and new processes/services requires a new holistic organizational paradigm along the value chain, covering efficient life-cycle design (Bendell, 2000), production, use and recovery. Garment development and production have to be done in flexible, dynamically interoperating networks of enterprises (Anderson-Connell, Ulrich, & Brannon, 2002), flexibly adaptive to new emerging production technologies and business models, fully adaptive regarding customized market requirements and new technologies (Mo & Nemes, 2001). The novel manufacturing system has to enable the garment to suit the final customer use in terms of functionality, comfort and fashion effects while increasing productivity and reducing time to market. Much more flexibility and dynamism than currently in the traditional, complicated, resource and waste intensive textile and clothing value chain is required.

This holistic organizational framework with related conceptions, methods and operational tools will allow the garment industry to develop and produce extended garment products in flexible, dynamically interoperating networks of enterprises. It enables an integrated management of existing and new products and processes for garments within new business models of the factory of the future. Moreover the proposed approach has positive implications also by the demand side. In fact, the high and early customer involvement into the design and concept steps allows achieving a high rate of customer satisfaction, minimizing returns of goods and restraining waste (Luttropp & Lagerstedt,1999; Candi, 2006). The consequent cost reductions benefit enterprise and customers as well.

The xSSO framework is the basic framework for modelling organizational networks with the constituting elements and their relationships, the dynamic behaviour in terms of stability, control structures, flexibility, self-adaptivity and robustness properties for the targeted knowledge-based, integrated garment production processes. It refers to suitable visualization and navigation software tools for selecting, designing and operating network instances, also including functionality and sustainability testing structures.

xSSOs are implementing and applying elements of both the dimensions of smartness (knowledge-base) and sustainability (eco-consistency) networked by powerful ICT structures in a trans-disciplinary environment including engineering, economics and social perspectives (Vieira, 2009).

The xSSO application framework consists of the model set the repository and a configurator, whose main aspects are outlined in the next sections, and various implementation sets besides the operational systems. These elements are interacting with the goal to support garment companies enabling the establishment of smart organizations. An overview of the interactions is given in Figure 1, describing the principle sequence of interaction.

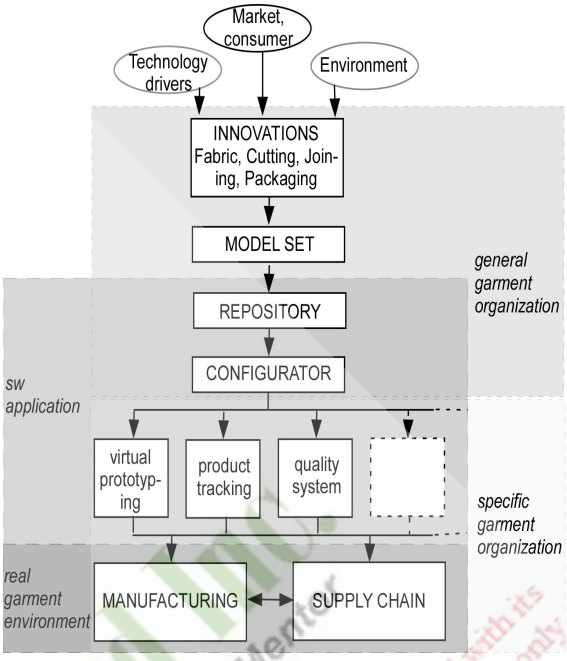


Figure 1: Context of the xSSO framework

MODEL SET

The Model Set is the first step of the research and comprises the analysis of competitive behaviour of firms operating in the garment industry and their abstraction into models. The out coming models refer to all aspects of operational activity in the garment manufacturing and garment supply chain. A set of model types aligned in a concise structure has been developed, based on state-of-the-art frameworks for enterprise and ICT modeling (Porter, 1998). Following the xSSO conception the Model Set allows creating a consistent, comprehensive integrated set of models of enterprise acting in the garment value chain (Nordås, 2004).

The modelling subjects range from representing data to representing conceptions and ideas from organizational aspects to product aspects. The xSSO Model Set supports various levels of abstraction and innovations. It also supports various specific views of an organization. Model types of various levels of abstraction but with the same scope can be combined.

The xSSO Model Set constitutes the comprehensive knowledge about the structural needs of different emerging areas, like new materials, new flexible automation cells, new garment virtual prototyping, in a sustainable organization framework. A model consisting of three layers and views corresponding to respectively the rows and columns in the overview in Figure 2 was implemented.

xSSO	SMART SUSTAINABLE ORGANIZATION		
	Organization view	***Processing View***	***Product view***
Knowledge asset later	Knowledge about organizational Structures	Knowledge about Process and Resources	**Knowledge about Products**
Sustainability layer	Sustainability constrains on organization	Sustainability issues on process and resources	**Sustainability issues on products**
Organization layer	Business model	Business process	**Business service**
ICT layer	**ICT architecture**	**Information flow**	**Product data**

Figure 2: Overview of the xSSO model set

REPOSITORY

The repository is the concretization of the model set activity, cataloguing all the models developed in the previous research's step. Its main objective is to allow data storage and reuse from the Configurator. The repository is specifically designed to store models related to traditional issues and innovative solutions as they are created and developed. These models are then used as basis to start the analysis required to applying these technologies to the actual configuration of the industry, suggesting the areas where a major effort in modifying the status is required.

The model development is, actually, based on GME (General Modelling Environment) that is an open source application, developed by the Institute for Software Integrated Systems of the Vanderbilt University. XML format is the source of information used by the repository.

The design of the repository starts from the xSSO Model Set in order to separate the data structure from the application (GME) that uses it. This choice allows changing the application platform without loss of information or models.

The implemented structure is very simple and do not investigate the intrinsic nature of the component: all objects are similar, only common characteristics are used: the object has a name, a description, some attributes, a position in the diagram and connections with other objects.

Different components have different associated rules and a graphical aspect that differentiate each other. The rules and the graphical aspect refer to a metamodel that is common to all models Rules describe the behaviour of a component, for example how to connect with another component, how many component of each type can be inserted in a model and so on.

The xSSO Repository is a relational database that stores the GME model and collaborates with the Configurator. Also, the xSSO has some simple web interfaces to manage the inserted model, user information and rights. It can be easily connected with web publication tools, like Java servlets or PHP pages, or with remote application through a secure socket.

CONFIGURATOR

The Configurator is a software tool which enables firm to query the repository in an easy to use and user-friendly way. It enables the selection of best suitable innovations for the design and operation of individual enterprise in smart networks. After the selection, in fact, each proposed innovation is visualised together with current situation of the (extended) enterprise. The configurator's outcome is not only a set of possible innovations to improve firm's competitiveness and efficiency but it offers ready to use and customised software.

To improve the usability for the user, the models of the innovations and their relationships are presented graphically. Navigation within these models is possible, based on the relations in and between models.

Navigation is very important for the user to quick find and assesses suitable innovations. Therefore a navigation based on classifications is applied. There should be no restrictions for creating classifications. The classifications suitable for navigations are created as a tree because circular relations between navigations will irritate the user. The classifications should be extendable without the need to change the classification of existing innovations. All data concerning the models are stored in the xSSO Repository and all data necessary for evaluation of models are stored in the xSSO Configurator.

Due to the strict splitting of data and evaluation logic, the Configurator accesses the model data with the help of high-level functions provided by the Repository. For sake of portability these high-level functions are designed to be independent from the technical implementation of the data pool to allow an easy change of the data delivery system. The evaluation logic should also be independent from the Model Set, so that changes to the Model Set do not require a redesign of the evaluation logic but only marginal changes should be needed.

The selected system allows the flexible design of objects which are used for the evaluation logic. Each object has a freely defined set of attributes helping the navigation and allowing, without additional configuration effort, to make a full-text search or an attribute-specific search. Therefore the configuration of the system is mainly focused on creating the necessary objects to realise the classifications, navigation and evaluation logic.

CASE STUDIES

The over outlined xSSO framework allows modelling of and analysis of an existing network for innovation and production, and it let to select and configure appropriate measures in order to improve the integration of activities and actors. ICT technology plays a strategic role supporting the garment supply chain management and networking, allowing integration between different actors along the chain, supporting information-sharing (Kollberg & Dreyer, 2006). ICT plays also an important role in the strengthening and reinforcing the sustainability efforts giving a greener face to the fashion value-chain (Sahni, 2010).

Radio Frequency IDentification technology (RFID), virtual prototyping and design, Computer integrated manufacturing (CIM) as well as vendor managed inventory (VMI) and collaborative planning, forecasting and replenishment (CPFR) are examples of ICT based solutions improving efficiency by sharing information related to matching demand and supply such as short- and long-term production planning, demand forecasting, materials and capacity planning. The first two solutions are stand-alone analysed in the following sections.

PRODUCT TRACKING

1. Technology Background

Product tracking technology is gaining increasing importance due to the globalization process and to the resulting global and complex supply chain's configuration. The markets of the modern world are characterised through an increasing globalisation and rapid technology changes.

This situation asks for ICT technologies and applications which enable the identification of products as single items, of item working resources (e.g. cut, sewing machines), of logistic entities (e.g. transport units, boxes, cartons) by attaching different information (e.g. status values, quality control information, progress messages) to the single items in an inter-firm way. This information has to be readable from different players in the value chain.
To identify goods along the value chain, the RFID technology has been selected, being a contact-less and reliable identification technology (Wang, Tang, Sheng & Wang, 2006).

Typical RFID mobile device uses client-server architecture. Because the device runs in a web browser, every computer with an internet connection serves as client. A hand-held RFID scanner can be connected to this computer enabling to collect RFID data from the scanned tags. The data is then transferred via the internet connection to the prototype server instance where it could be processed.

2. Economic implications.

Globalization process results in an increasingly intense competition, as new producers and merchants gain access to previously well limited markets (D'Aveni, 1994). Innovation, the increase of productivity and the optimisation of business processes are keys to survive and prosper in this

environment (Porter, 2001).

The RFID system could support companies' competitive challenge supporting garment supply chain integration, offering a quick and transparent order, manufacturing and delivery process to the customers ordering, with positive implications in terms of quality and efficiency. Additional benefits of RFID relate to the production phase in terms of logistics and security, improving available information through the supply chain, and in terms of networking configuration of production, allowing information exchange between commissioning industries and suppliers. The increased reliability given by the RFID traceability properties makes the possibility to match apparel parts (trousers and jackets), realised by different suppliers, much easier then previously.

RFID could, for examples, enhance the process of create and verify the delivery notes. Through scanning of objects tagged with an RFID label it is possible to automatically add and verify the goods that are packed for transportation and automatically assign carton numbers. Compared to other methods this modified process yields the potential to save time and costs, especially for the actors in later steps of the chain, like transportation service providers or customers.

(Courtesy Salpomec Oy)

Figure 3: RFID Based inventory

Customer driven integrated manufacturing tracking systems allow individualized web orders to be processed in 'real-time' and 'tracked' throughout the supply chain. Straight forward CAD/CAM processing technology interlinking web frontend 3D configuration processes and e-shops with backend weavers and manufacturers generates automatically BoL/BoM embedded into the SCM system "TXTChain". Both B2B and B2C tracking tools are available from order input until home delivery, info for the latter the customers can trace in his e-account on the retailers website.

Concerning the sustainability issue, RFID achieves higher efficiency which leads to sustainability through its positive implications in inventory productivity and accuracy and operating efficiency. The technology helps in errors location, in loss prevention, in unnecessary truck deliveries minimization, in cloth life cycle management, in stolen items control and in reduction of customers' trips to store for items that were out of stock during their initial visit. It could works also on the consumer behaviour, raising consumer awareness of the apparel life cycle and communicating how each garment rates in terms of overall sustainability (Treanor, 2011).

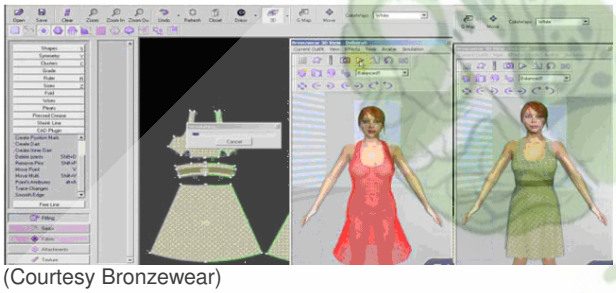
Moreover RFID technology and product tracking solutions are fundamental pillars in the evolution of digital clothing supply chains, from design to retail, that minimize returns and reduce waste.

VIRTUAL PROTOTYPING

1. Technology background

CAD tools have greatly evolved and new techniques and capabilities were introduced allowing the 3D representation of soft material in a dynamic environment. So today the most updated ICT technologies can be applied to the design and evaluation of garment new collection in terms of virtual, instead of physical prototypes in a collaborative manner (Magnenat-Thalmann, 2010; Apeagyei 2010). Design and prototyping are critical activities in order to meet consumers demand, to reduce wastes and to address sustainability issues.
The key innovative concepts are based on ICT technical developments offering a comprehensive methodology for garment design performed directly in 3D, replacing virtual prototypes instead of physical prototypes, contributing to reduce the time-consuming tasks of design and prototyping. Recent CAD processes allow to represent typical body shapes integrating representative female and male morphotypes derived from hierarchical statistical clustering of Anthropometric Survey data or based on specific customer sample data acquired through three-dimensional (3D) body scanners (Zulck, Koruca & Borkircher, 2011).

The development of a web platform enabling e-collaboration between potential users of 3D design and Virtual Prototyping, such as product managers, designers, modelists and sales and marketing personnel in a scenario intended to speed up and enhance creativity and effectiveness represents a further important key opening new challenges to enhance sustainability in clothing supply chain. This platform can be linked to other satellite web-delivered services, such as a fabrics library, a cost estimation module and a real-time animation module, offering visualisation of animated virtual mannequins 'dressed' with the new creations and allowing the customer himself to virtual dress the garment for appreciating its look and for feeling its comfort.



(Courtesy Bronzewear)

Figure 4: Interface of a platform for garment virtual fit testing

2. Economic Implications

Virtual prototyping application has strong economic implication in terms of efficiency improvement and cost reduction as well as in terms of customer satisfaction and customer relationship management (CRM).

The simulation introduction all along the design process and the virtual prototyping allow garment companies to adopt postponement strategy and just in time strategy. This ICT based solutions linked to the e-business make it possible to assembly the final product only when customer has just acquired it. Economic benefits relate to stock and waste reduction, inventory lower costs thanks to lean production adoption, improved quality levels and compressed production cycle time. Furthermore this technology could support the control over the manufacturing and development process of garments, thanks to its easy integration into existing production plant and in the future flexible automation production.

Considering the customer point of view, he is deeply involved since the design and concept phases till to the production and logistic ones (Abecassis-Moedas, 2006). Customers are able to design their personnel ideal garment matching at the same time the hand made comfort and fit evaluation benefits with affordable costs levels and delivery time.
Concerning the sustainability issue, virtual prototyping supports the digitalization process of the garment supply chains, through e-configurators, digital design toolkits, online dressing facilities and the development of "controlled" virtual shopping communities. The digital assessment of fit forms is more accurate in 3D; this has positive effects on sample budgets and therefore means fewer physical samples, lower transport costs, less material use and, above all, time savings. It is a keystone in developing a garment sustainable supply chain, allowing the product to remain in digital form until later in the process. At least in fact it is more sustainable to create and buy a garment in a digital form, because whenever a physical sample is created, waste is introduced into the process.

CONCLUDING REMARKS

The xSSO is a web-based decision support system, enabling visualisation and navigation for identifying, selecting and designing innovative methods and technologies for the garment industrial sector, in order to improve the integration of activities and actors. The interactive overall platform allows to reach a high integration level of the entire supply chain, from the front-end collaborative design toolkit up to manufacturing and e-fulfilment, thanks to ICT technology. The two ICT based solutions analysed show the technology contribution in terms of variety synchronisation from design to production, from sale, delivery and post sale.

By the economic perspective, the xSSO framework allows to minimize stock and its related costs and to achieve important competitive advantages both in terms of cost and diversification advantages. The xSSO is also a Consumer Driven Manufacturing business model which reduces stock wastes and promotes a real sustainable supply chain. These savings result in a win-win situation for all the players involved in the supply chain.

Thanks to ICT and internet application, the process integration of CAD-CAM is accelerated and

optimized in a global CDIN (Computer Driven Intelligent Network), where the consumer becomes producer (prosumer), driving the fully integrated supply and manufacturing chain by him or herself.

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Factors Influencing the Selection of 3G among Indian Consumers: *A Statistical Introspection*

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ABSTRACT

The International Telecommunications Union (ITU) defines the third generation (3G) of mobile telephony standards IMT-2000 to "facilitate growth, increase bandwidth, and support more diverse applications". Urban consumers form a total of thirty percent tele- density of the total phone user –base in India thereby indicating a huge scope for future growth. The study was conducted with an objective to identify the factors influencing the selection of mobile phone service provider among urban users and also the role that demographic factors play in selection of 3G services. A structured questionnaire was drafted to collect data regarding the customer opinion on 3G services. The sample size of 150 was taken from Delhi and NCR. The data contains the personal details, demographic details and factors influencing customers to select the 3G service. To achieve the objective reliability test, factor analysis, Kmo Bartlett's, variance Analysis was conducted. This study brought out clearly that the major factors influencing the choice of service providers were value added services, low cost, speed, customer service. Call drop was observed to be the most important reason for switching over to other mobile phone service provider.

KEYWORDS

Urban customers	Network coverage
Mobile phone service providers	Price
3G	Indian Consumer
Telecommunications	Mobile Communication

PREAMBLE

Globalization has made drastic changes in world economy and it has offered loads of opportunities for business houses and industries especially telecommunication industry. 3G or 3rd generation mobile telecommunications, is a generation of standards for mobile phones and mobile telecommunications services fulfilling the International Mobile Telecommunications-2000, (IMT 2000) specifications by the International Telecommunication Union [1].

The main enabler of modern economy is Telecommunication sector and its growth is critical for acceleration of the economic development of any country. The government of India recognizes that the provision of a world class telecommunications and information infrastructure is the key to rapid economic and social development of the country. Telecommunication is critical not only for the development of the information technology industry but also has widespread implications for the entire economy of the country. Cellular Mobile services .There has been unhindered growth in the Indian telecom market.

The world is speedy changing with escalating trends in the communication sector. Extreme shifts have take place in the technique populace used to commune. The implementation of technology, not only in the metropolitan cities but also in the rural areas is experiential in present occasion. This is principally due to the growing consumer awareness and adaptableness towards newer technologies.

The increasing use of applications on 3G phones is situating to constrain the sales and consciousness as well. This in rotate will also take action as a income production commerce in the future. The growing reputation of mobile entertainment is a noteworthy amplification factor as admittance to mobile games and video-based content would need high swiftness. This would result in amplified adoption of 3G services.

The government of India run Bharat Sanchar Nigam ltd (BSNL) launched the 3G enabled mobile and data services in the year 2008.MTNL, another government of India owned company launched 3G in Delhi and Mumbai afterwards.

The auction of 3G wireless spectrum was announced in April 2010 all over the country. On November 5,2010 Tata DoCoMo, was the first private sector service provider that launched 3G services, Reliance Communications was the second company to join the league. Bharti Airtel launched their 3G services in Bengaluru on the 24th of January 2011 it later launched its 3G services in Delhi and Jaipur on March 4, 2011. AIRCEL another service provider launched its 3Gservices in Kolkata in the month of February. Vodaphone and Idea are other service providers who would be launching their 3Gservices by the first quarter of 2011.3G are a third generation cellular mobile technology.

The third generation is a far more advanced technology than the earlier ones. 3G mobile phones not only have the feature that they are most known for but also have conventional voice, facts and data services , video and data services which can be used while on the move but are also supported by higher resolution video. It includes virtual banking and online billing, access to internet, online entertainment, video conferencing and other mobile office services. 3G technologies in your mobile phone are not only limited to help you out while you

are on the move but also when you are stationed at home. 3G has many different applications, such as it can help you shop for your daily needs way in advance at your local store, you can order your goods which would be saving a lot of your precious time.

With 3G on the horizon, things are going to change, it will completely change the way people today communicate with one another. A user would find multiple new ways of using his mobile phone. It wouldn't be a dream anymore to watch your favourite television show on your phone and have a video conference with your near and dear ones or business associates who have access to 3G technology. 3G technology has a lot to offer in terms of new technique and latest advancements in the field of telecommunication like the amazing teleconferencing, but there are a few things that make 3G telecommunication technology as disadvantageous, the main being 3G phones are far more expensive another disadvantage is that 3G phones can avail the video conferencing feature only with other people who are 3G subscribers.

3G as a product has revolutionized the Indian telephony market, through 3G Indian consumer of today get true mobile broadband with better than before speed faster data transfer ,enhanced internet usage on the move .3G not only brings features like video calling but also it will be able to garner a lot of respect for the Indian telecom sector. Indian consumer is a whole new market which is hungry for purchasing, downloading features and applications for their mobiles. Already the consumer of today is downloading songs, wallpapers, ringtones, but with advent of 3G, it will be a different ball game all together. The late arrival of 3G technology in the Indian market may prove beneficial for the country as most operators are already aware of the loopholes and the factors inhibiting the adoption of 3G services in the international markets.

CHALLENGES OF ADOPTION AND IMPLEMENTION OF 3G SERVICES

There are number of challenges that need to be overcome and rationally addressed by the Indian operators for successful implementation of 3G adoptions and implementation. Rules and regulations set up by the TRAI and the Indian government, such as pricing issues for the auction of 3G spectrum and standards for mobile number portability, could impede the pace of adoption of 3G services in India. The Indian consumer is highly price sensitive in terms of adopting new services, thereby affecting the widespread adoption of 3G services. The relatively higher price of 3G-enabled handsets as compared with its non-3G counterparts may inhibit the adoption of 3G services in the Indian market.3G Subscriber Base believes that the number of 3G subscribers in India will grow at a rapid pace by 2013, See (figure 1).

This growth will be fuelled primarily by a decline in the price of 3G services, resulting from fierce competition among private players. The launch of 3G services in India will improve consumers' experience by providing high-speed Internet access and better quality of voice and data services. The services will be available in both urban and rural areas, with initial focus on urban customers and will penetrate more in urban sectors, See (figure 2).

The following are some of the major factors that are likely to drive the adoption of 3G services in India: Demographic Factors, Income Level, Lower pricing strategy and higher disposable income of customers will result in increasing adoption of 3G services. Service Domain – 3G services such as video telephony, banking services, mobile- learning and mobile- governance provide convenience and mobility. Easy access to banking services is expected to attract urban consumers, while mobile governance will be more popular among rural

consumers. The growth in the 3G subscriber base will be driven primarily by the adoption of the service by the Urban (Above Poverty Line) customer segment. This segment is expected to be the fastest adopter of this new technology, (Khanna& Gupta ,2009).

REVIEW OF LITERATURE

Clark, Robert (2004) discussed the latest mobile phone technology, 3G or 3GSM in Asia. Increase in the number of mobile phones offering 3G in the marketplace; Companies who have decided to focus on the new technology; Advantages of 3G. Pagani (2004) conducted a study to identify the determinants of adoption of 3G mobile multimedia services and found that perceived usefulness, ease of use, price, and speed of use are the most important determinants of adoption of 3G multimedia mobile services.3. Erlanger, Leon (2006) outlined the advantages of 3G over wireless-fidelity by citing several 3G subscription options. Et, al (2009) analyzed the mass adoption of third-generation (3G) mobile phones that is hypothesized to comprise three consumer perceptions: new technology, new service, and new handset. Based on the theoretical framework of a consumer's decision making process, an empirical study of the mass adoption of 3G mobile phones in Taiwan was conducted.

This study demonstrated that perceived utility of a new mobile service was a key factor that resulted in mass adoption. Further, it was found that perceived utility of a new handset directly stimulate consumers to purchase 3G mobile phones. Perceived risk and perceived expense are not negatively correlated with intentions as hypothesized. Moreover, perceived no need was another key factor that inhibited adoption and purchase intention.

Chong,et el (2010) analyzed the factors influencing the usage of 3G technology in Malaysia. By extending the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) model, this study found that perceived advantages, perceived ease of use, variety of service and social influence are able to predict the adoption of 3G among Malaysian consumers. This study allows 3G service providers to understand which factors influenced the usage of 3G in Malaysia. Other developing countries that plan to deploy 3G can also formulate business strategies using the results from this study.

Ramnath (2010) discussed the move of the telecommunication companies to embrace third-generation (3G) applications and technologies in India. It outlines the advantages of 3G services which provide better quality voice calls as well as 10 times more efficient use of spectrum than the second-generation (2G) phone systems. However, it mentions the skepticism of the phone service and equipment vendors as well as the handset manufacturers regarding the complexities of implementing the system. Suki (2011) analysed the factors influencing subscribers' intention towards using 3G mobile services with the Technology Acceptance Model (TAM) as the guiding principle. Also, Perceived Usefulness was found as a key factor influences subscribers' intention to use 3G mobile services.

RESEARCH OBJECTIVES

- To study the factors influencing the selection of mobile phone service provider and 3G services.
- To study the inter-relation between social, economic and entertainment factors in selection of 3G service.

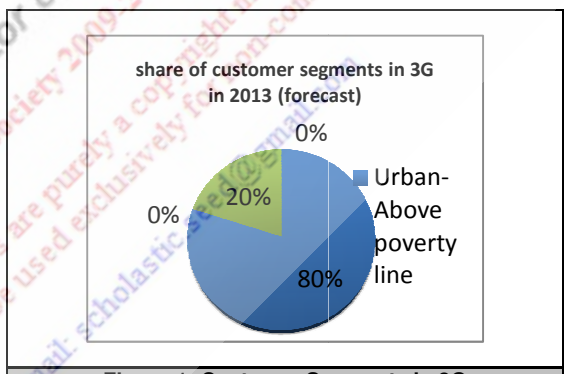


Figure-1: Customer Segments in 3G

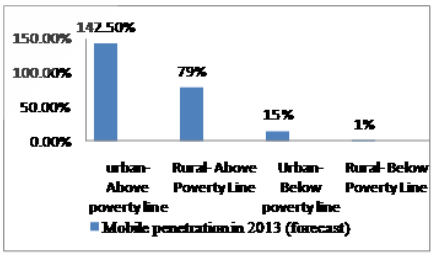
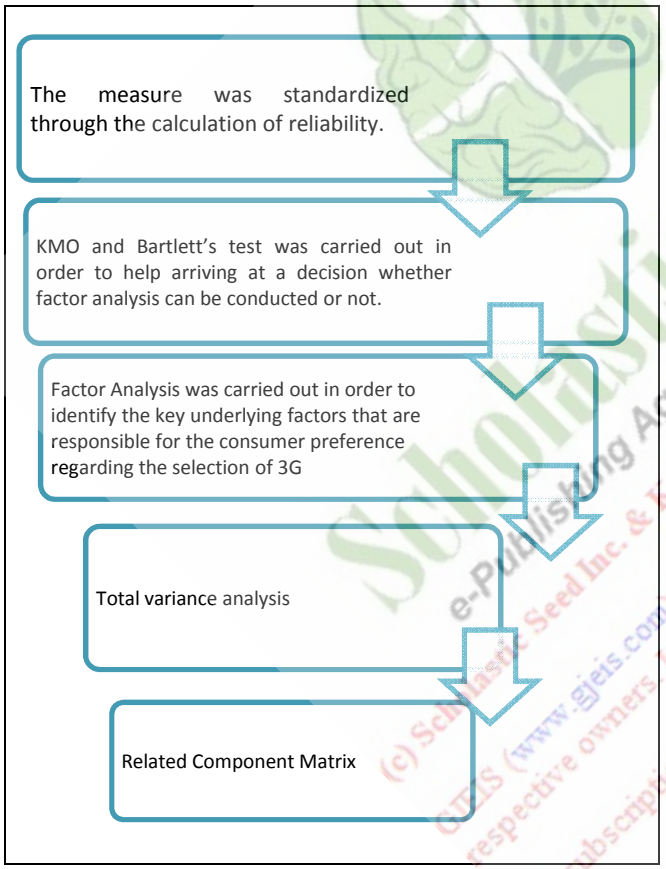


Figure-2: Mobile Penetration in 2013

RESEARCH METHODOLOGY

Achieving accuracy in any research requires in depth study regarding the subject. As the prime objective of the project is to analyze the factors that make customers subscribe for 3G services, Primary & Secondary both data was used wherever needed. The population of the study covered over all the network connection subscribers in Delhi and NCR. An individual respondent were the sampling element. Whereas, the sample size was 150 respondents. For the purpose of identifying the underlying factors which leads to the selection of 3G service, a self designed questionnaire was used. Following are the tools and techniques used for the analysis:



Panel 1

Table No.1a: Details of Respondents

	Categories	Count	Percentage
Gender	Male	94	62.7
	Female	56	37.3
Age	18 to 21 years	22	14.7
	22 to 25 years	116	77.3
	26 to 31 years	10	6.6
	32 to 56 years	2	1.4
Network	Airtel	56	37.3
	Vodafone	43	28.7
	Idea	15	10.0
	Reliance	14	9.3
	Aircel	8	5.3
	Tata Indicom	4	2.7
	MTNL/BSNL	9	6
	Virgin	1	.7
Plan	Prepaid	117	78
	Postpaid	33	22

Panel 1

Table No.1b: Reliability Analysis

Cronbach's Alpha	No. of Items
.812	13

Table No. 2a: Factors influencing the selection of 3G service

	Mean	Std. Deviation
Value added services	3.31	1.259
Low cost	5.97	1.145
Faster internet	5.10	1.151
Gaming	4.10	1.218
Video calling	5.73	1.183
Easy to use	2.86	1.176
Better network	3.58	1.057
Watching live TV	3.89	1.157
Faster audio and video downloads	5.43	1.198
Better voice clarity	3.63	1.803
Live information on mobile	4.67	1.065
Better customer care	3.41	1.050
Less call drop	3.65	1.068

Table No.2b: Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.692	36.096	36.096	4.692	36.096	36.096	4.326	33.277	33.277
2	2.038	15.675	51.771	2.038	15.675	51.771	1.947	14.977	48.253
3	1.446	11.124	62.895	1.446	11.124	62.895	1.903	14.641	62.895
4	.813	6.254	69.149						
5	.697	5.361	74.509						
6	.669	5.149	79.658						
7	.511	3.934	83.592						
8	.482	3.709	87.301						
9	.416	3.198	90.499						
10	.406	3.127	93.626						
11	.310	2.382	96.008						
12	.294	2.260	98.267						
13	.225	1.733	100.000						

Extraction Method: Principal Component Analysis.

Table No. 3a: Socio and Economic Factors

Social factors	Entertainment	Economical and convenience
value added services	Gaming	Live information on mobile
low cost	Watching live TV	Better customer care
Faster internet	Easy to use	Less call drop
Better network		

Table No.3b :KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.826
Bartlett's Test of Sphericity	Approx. Chi-Square	772.560
	Df	78
	Sig.	.000

Table No.3c: Rotated Component Matrix

	Component		
	1	2	3
Value added services	.808	-.033	.094
Low cost	.795	-.014	.009
Faster internet	.859	.021	-.005
Gaming	.206	.780	.085
Video calling	.538	.294	.046
Easy to use	-.013	.792	.089
Better network	.783	.251	-.086
Watching live TV	.452	.608	-.049
Faster audio and video downloads	.727	.227	-.135
Better voice clarity	.781	.151	-.034
Live information on mobile	-.112	.338	.605
Better customer care	.003	.005	.855
Less call drop	.046	-.055	.867

ANALYSIS AND INTERPRETATION

This section deals with the findings related to classification of respondents on the basis of type of billing plan, duration of subscription, mobile number service provider, and company wise classification of respondents for perceptions towards various parameters of quality of service. The data that is represented shows that the sample is male dominated as male respondents are 62.7% of the total sample size, see (Panel1: Table 1a).The respondents age analysis shows that most of the respondents are in the 22 to 25years of age group, i.e about 77.3% of the sample. Looking at the network connection used by the respondents it is found that majority of the respondents are Airtel subscribers i.e. 37.3% and it is closely followed by Vodafone subscribers which is 28.7%. Majority of the respondents were subscribers for prepaid connection i.e. 78% .In order to accurately capture the customer's response reliability analysis is carried out. See (Panel1: table1b) the Cronbach's Alpha value is .812 which is greater than 0.5 thus we can safely conclude that the sample size and the data collected are reliable and also the reliability is shown to be good using all 13 items.

FACTORS INFLUENCING THE SELECTION OF 3G SERVICE

After the analysis we can find the descriptive statistics of mean and standard deviation of various factors that influence the selection of 3G services by the consumers in Delhi. It has been found that low cost rate (with Mean=5.97) has been an important factor that drives customers to use 3G services on their handsets. It is then followed by video calling (with Mean=5.73), which implies that other than cost, customers also, want to use 3G for video calling service. Thereafter, Followed by that customers use 3G services for faster audio and video downloads (with Mean=5.43). Using 3G in order to get fast internet connection has found place among one of the reasons why the customers want to use 3G, it had scored a (Mean=5.10). Using 3G service for better voice clarity has a high standard deviation of 1.803 which shows that some of the customers choose 3G for voice clarity, while others don't, as this factor shows high variation, See (Panel 2: Table No.2a).

KMO and Bartlett's test scores varies between 0 to 1. Closer the score is to 1 the better it is considered. This test is done to arrive at a decision whether to conduct Factor Analysis or not. As in the case above KMO value is .826 which is greater than 0.5 and a significant Chi-Square value tells us that we can proceed with the Factor Analysis, see (Panel3: Table3b) .On conducting the variance Analysis we can see in (Panel 2: Table No.2b) that 62.895% of the cumulative variance is achieved with 3 components, i.e. we can summarize the 13 variables into 3 major factors, see (Panel 3: Table 3c).

After a close examination of all the factor loadings in **(Panel 3: Table No.3c),** the above 13 variables were found to be associated with the respective dimensions as shown in the **(Panel 3: Table 3a).** From Table No.3a it can be analyzed that: The social factors are interrelated to the dimensions like value added services, low cost, faster Internet and better network. The ability to watch live TV and ability to play games with the help of the 3G services play an important role in showing how the factor of entertainment is related to the use of 3G services; however 3G is not easy to use.

When it comes to the economical and convenience value related to the 3G services live information on the mobile supplemented by better customer care and less call drop shows how 3G is a technology for the future.

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Assessment of Good Governance Initiatives of Government Agencies of State of Delhi

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ABSTRACT

Government of Delhi is constantly working towards the development of the city and striving to facilitate better living for its citizens. Government is aware of the fact that citizens have to interact or deal with different government agencies for their different day to day requirements and many a times have to face difficulties. The delivery of services has improved over the years but volume of work is also increasing in greater proportions. Increasing and shifting population, coupled with nuclear family along with decreasing social interactions has enhanced the complexity of the delivery of services to the satisfaction of the public. There are certain actions, which are taken by particular department or agency to improve its efficacy. But some initiatives have been taken up centrally to improve the working of the officials, which is essential to keep pace with the changes taking place in society. These are in consonance with the technological advances taking place globally. Government of National Capital Territory of Delhi has initiated many programs for offsetting the polarization of resources and achieving economic growth. To enhance the efficiency and effectiveness of such measures government has even moved beyond the standard exercise of measuring the performance through budget utilization, financial expenditure and physical target assessments. Delhi has a unique position and developmental demands, due to it being a city-state with fast expanding population and lots of expectations of its citizens.

KEYWORDS

NCT	Delhi
Good governance	Governance system
Bhagidari	E-Governance

PREAMBLE

Government of Delhi has taken many initiatives for making governance system more responsive and accountable. Steps have been taken towards improving the quality of public services, degree of equity in public decisions and participation of citizens in getting feedback of the action taken. The civil society initiatives to improve governance have grown in scale and content during the last few years. Some of the major initiatives taken by the government of Delhi are:-

1. Citizen Charter

It has been used as a tool to improve the quality of public services. All departments have prepared citizen characters, which give information about services offered with time schedule fixed for each service. These charters are available on websites also. This is the first foot forward taken towards transparency. It also fixes a deadline for officials.

2. Right to information Act and Grievances Commission

Delhi was one of the few pioneer states to recognize the right of the citizen to have information and thus enacted Delhi Right to Information Act (2001). Grievances Commission was set up in Delhi to settle the grievances of the public. Grievances commission has been working successfully in Delhi. Now, with central law on Right to Information and Central Information Commission, the efforts have been strengthened towards achieving of transparency.

3. Public Interest Litigation

Public Interest Litigation is an important tool for activists and citizens to improve the quality of governance today. Delhi has a unique situation and many of the cases relevant to the citizens have been taken up by the Supreme Court as Public Interest Litigation's. Transport, unauthorized constructions and environmental pollution have been major issues taken up by courts as Public Interest Litigation's. There is difference of opinion regarding interference of judiciary in executive functions with many pros and cons attached to this. But citizens have one more forum by way of Public Interest Litigation's for redress of grievances.

4. Budget Analysis

Budget analysis gives insight into the functioning of the government and the relevancy of the expenditure can be judged by this analysis. Planning Department of government of Delhi along with Finance Department conducts such exercise, which gives insight into the physical targets and achievement in different sectors, projects and plan schemes. Monitoring of any project also becomes possible through this. Delhi is one of the few states, which have adopted the exercise of zero budgeting. Evaluation of work completion is also taken up at the end of the year.

5. Bhagidari Movement

Bhagidari is a means for facilitating citywide changes in Delhi by utilizing the processes and principles of multi-stakeholder collaboration. It aims to develop joint ownership by citizens and government in the change process and facilitate people's participation in governance. Active involvement and participation of the citizens through interaction with government agencies helps in better understanding of each other and helps in identification of the needs for fixing priorities of the works/activities. RWA's are involved in a big way and CM's office has created a separate Bhagidari cell to have co-ordination with all these participatory units. Regular meetings of RWA's are held at District Level and concerns of Bhagidars are listened to and addressed by representatives of all government agencies.

6. Civil Society Organizations

The involvement of Resident Welfare Association and other civil society organizations in good governance by ensuring transparency and accountability in Government machinery has been achieved in Delhi. Non-Government's Organizations are being involved in management of services especially in social sector, health and hygiene and education. Civil society organizations are encouraged and meetings are held with different associations, not only of the residents, but with the associations of markets and other professions as well. These organizations are also given certain grants for executing levels.

7. E-Governance

The tools of e-governance have improved transparency and thus helped in information dispersal and empowerment of the citizens. Departments have websites with complete

information regarding activities and its obligations. Tenders and results are also available on websites. Apart from having informative websites, most of the departments are receiving application forms and inquiries through websites. For example in Sales Tax, returns can be filed electronically and refunds are also given electronically. Education department issues transfer orders and also expenditure is monitored electronically only.

8. **Providing low-cost, high quality Citizen Centeric Services**

Placing citizens at the center of service delivery system needs special efforts. By empowering citizens with necessary information and effective redressal of complaints, helps improving governance. One Window System for all departments and convergence of social sector services at district level is an effort to provide quality service at lower costs and offer convenience to citizen.

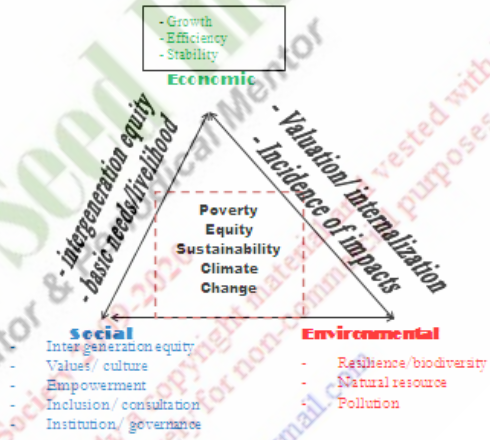
9. **Citizen Report Card**

There was an effort to get feedback to improve the quality of public services through an innovative tool known as Citizen Report Card, pioneered by Public Affairs Center in Bangalore. An initial work on this has been done and now efforts are being made to increase its area and effort so that improvements can be made in systems in each department according to the shortcomings printed out by citizens.

Delhi Human Development Report 2006 has outlined 9 Delhi Development goals which have been adopted from Millennium Development Goals (MDG). These goals are. Goal 1 Eradicate extreme poverty and hunger, To halve the proportion of people who live below the poverty line and suffer from hunger, between 2000 and 2015. Goal 2 Achieve universal elementary education by 2015. Goal 3 Promote gender equality and empower women. Goal 4 Reduction in child mortality. Goal 5 Improve maternal health. Goal 6 Combating HIV/AIDS, Malaria and other diseases. Goal 7 Ensure environmental sustainability. Goal 8 Strengthen Bhagidari. Goal 9 Improve Public Safety.

The nine initiatives mentioned are common actions, which have been taken by all the agencies. Apart from these common activities, agencies have taken up separate programmes and initiatives to improve their functioning so as to achieve nine development goals and sustainable of the city.

Sustainable development has economic, social and environmental dimensions (Munasinghe, 1992). The relationship and effect of these 3 key elements of sustainable development, which are also indicators of good governance is given in the figure A.



Source: **M.Munasinghe, 1992**

Figure 1: Key Elements of Sustainable Development

This diagram illustrates that all these indicators of good governance which have linkages with each other can be placed under 3 categories. Each category or system has its own distinct driving forces and objectives. The economy is geared towards improving human welfare, primarily through increases in consumption of goods and services. The environmental domain focuses on protection of integrity and resilience of ecological system. The social domain emphasizes the enrichment of human relationships and achievement of individual and group aspiration.

Indicators are an excellent tool for communities working toward a common goal. When properly designed, they can forewarn a community about a potential problem or negative trends before its effects become irreversible. They can demonstrate the linkages among large social, economic and

environmental systems and help to identify the cause of complex problems. They can measure the effectiveness of policies and projects. Most of all, they can simplify, yet comprehensively track a community's progress towards its goals (Besleme and Mullin, 1997).

United Nations has listed 132 indicators as indicators of sustainability and has categorized these in social economic, environmental and institutional categories (Bell and Morse, 1999). These measurements of sustainability are not confined to few quantitative parameters but consist of wider qualitative indicators. These qualitative indicators can also be placed under three categories. In fact these are initiatives, which are essential and can be thus measured for attainment of sustainable development.

Even if we never use a single indicator the process (of their development) has given us so much that one learns during process itself (Meter, 1999). Indicators are a logical device to use in sustainable development, especially given their long record of use in fields such as economics, social accountability and environmental science (Bell and Morse, 1999). . Kaufmann et al. (1999) highlight a number of reasons why it is useful to gather data on governance perceptions although the data collected is inherently subjective. For example, perceptions may often be more meaningful than objective data, especially when it comes measuring the public faith in institutions.

Court et al (2002) concluded that measuring issues of governance poses challenges that are not encountered in the economic or social development fields. While it is easier to provide firm indicators of such things as economic growth or primary school enrolment, it is much more difficult to find and agree upon indicators of a political macro phenomenon like governance or political rights. Perhaps because it is a broad and complicated concept, there exists no regular, systematic and cohesive data collection effort centered on the concept of governance. All these indicators are not inclusive. Involvement of stakeholders is very essential to know the indicators. Still indicators may appeal to a mind set for measurement yet they do not appeal to the popular imagination and this must limit their appeal to real people-the global community that is the target for the sustainability project (Bell and Stephen, 2003).

There is no consensus on the elements or indicators of good governance as different agencies have identified different elements as per their need, requirement and experience. In contrast there is a broad agreement inside and outside India on indicators of bad governance. (Human Development Report, 2003) Major among these is incidence of competition co existing with high level of mass poverty, illiteracy, and under-development and increasing criminalization of politics. In the good governance discourse, democracy emerges as the necessary political framework for successful economic development, and within this discourse democracy and economic liberalism are conceptually linked: bad governance equals state intervention; good governance equals democracy and economic liberalism (Abrahamsen, 2000). Development is a planned change process, which basically entails deviations from the present situations and balances.

To achieve sustainable development, it is essential that such development takes place in a way and by making such adjustments to the human activities so as to sustain and consume the natural wealth. Term social development and sustainable development are being used interchangeably only because it has been realized that development in society is long lasting only if it does not disturb the delicate environmental balance. This means that all natural assets including human, deserve to be given their rightful place and treatment and cared for whenever such planned change of development takes place. Under the circumstances, effective governance within the available frame of resources and capabilities is the solution to minimize the managerial stress and maintain an adequate level of urban services and facilities. The response to these challenges lies in good governance. Good governance makes accountability, transparency, participation and rule of law mandatory administrative functions. They are vital pre – requisites for sustainable development also. Government has to function in a more missionary, egalitarian and energized manner (Barthwal, 2003).

As part of the World Governance Survey (WGS) project, a comprehensive assessment of governance at the national level in India was conducted in 2001. 177 experts from four states – Andhra Pradesh, Bihar, Delhi and Kerala; completed a questionnaire providing their ratings and comments to 30 indicators of governance. The findings do suggest that even in a country of the diversity and complexity of India it is feasible and valuable to carry out such governance assessments. Nevertheless, due to some

methodological challenges, findings are indicative rather than conclusive. The survey does highlight some bright spots, including high levels of freedom of expression and association; high levels of political competition ; a respected bureaucracy; and a military that accepts its subordination to civilian government. However, there was an overarching concern that policy-making is rather divorced from the people – especially the poorest members of society. Democracy in India is more impressive in form than substance. More specifically, the survey found that corruption was the most important governance challenge in the country (Court, 2003).

Government cannot meet people's aspirations unless their decision makers are prepared to look afresh at service delivery system, poverty and administrative management system. Such change in perspectives must be accompanied by change in their attitudes, leadership styles and goals. Harmonizing the attitudes, structures and processes of government with the aspirations and needs of its citizens is the first step. The results on the ground in terms of social and economic development since independence are rather disappointing and this has happened when we have rich human and other resources, comparable capacities and capabilities which are second to none in the world. (Jalan, 2004).

OBJECTIVES OF THE STUDY

Specific objectives of the Study are to assess and analyze the impact of various Good Governance initiatives on the working conditions and acceptability by stakeholders. Accordingly four hypotheses have been framed.

1) There is difference in the perception of the stakeholders on the assessment of the socio-economic & environmental impact on the lives of the people in state of Delhi resulted due to the good governance initiatives taken by different government agencies of Delhi state.

2) There is difference in the perception of the different categories of stakeholders i.e. general public/citizens, political persons/elected representatives, legal professional/judiciary/advocates, bureaucracy/officials and media & communication professionals on the assessment of the socio-economic & environmental impact on the lives of the people in state of Delhi resulted due to the good governance initiatives taken by different government agencies of Delhi state.

3) There is no difference in the perception of stakeholders of different age groups i.e. young adults (18-35 years), middle aged (36-55 years and elderly (56 & above years) on the assessment of socio-economic & environmental impact on the lives of the people in state of Delhi resulted due to the good governance initiatives taken by different government agencies of Delhi State.

4) There is no difference in the perception of stakeholders of both the sexes on the assessment of socio-economic & environmental impact on the lives of the people in state of Delhi resulted due to the good governance initiatives taken by different government agencies of Delhi state.

RESEARCH DESIGN

To carry out the objective of the study, nine different agencies of the government of Delhi were selected. The selection of agencies was based on a general survey conducted asking people to respond to a single question that in their view which agency of the government affect their day to day lives in a major way and so they have to deal with the agency more frequently.

In response, people named the field units of the agencies like local electricity Sub-Stations, zonal office of Municipal Corporation of Delhi, Motor Licensing Officer's office of transport department, Station House Officer's office of police, Sales Tax Office of Value added Tax Department, Sub-Registrar office of Deputy Commissioner, Revenue or Rationing Shop/Ration card office. However it was thought appropriate to consider Department as a whole instead of Individual Branch of the Department as Department is responsible for controlling the policies and its implementation. After initial exercise of identification of selection of government agencies was completed, these 9 departments were shortlisted with 5 types of stakeholders from different age groups and genders. Thus the total sample was constituted as follows:

Agencies/ Departments (9)	Stakeholders (5)	Age Groups (3)	Genders (2)
1. Delhi Development Authority 2. Delhi Police 3. Delhi Jal Board 4. Food and Civil Supply Department 5. Municipal Corporation Of Delhi 6. Revenue Department 7. Trade and Taxes Department 8. Electricity Department 9. Transport Department	1. General Public/Citizen 2. Political Persons/ Elected Representatives 3. Legal Profession/ Judiciary/ Advocates 4. Bureaucracy/ Officials 5. Media and Communications	i) Junior Group -18-35 years ii) Middle Group -36-55 years ii) Senior Group - 55+ years	Male Female

Five respondents for each category of gender, age group and stakeholder groups were taken. Sample size was 1350.

The matrix is

2 (Gender) X 3 (Age groups) X 5 (Stakeholders) X 9 (Agencies) X 5 samples in each category=1350

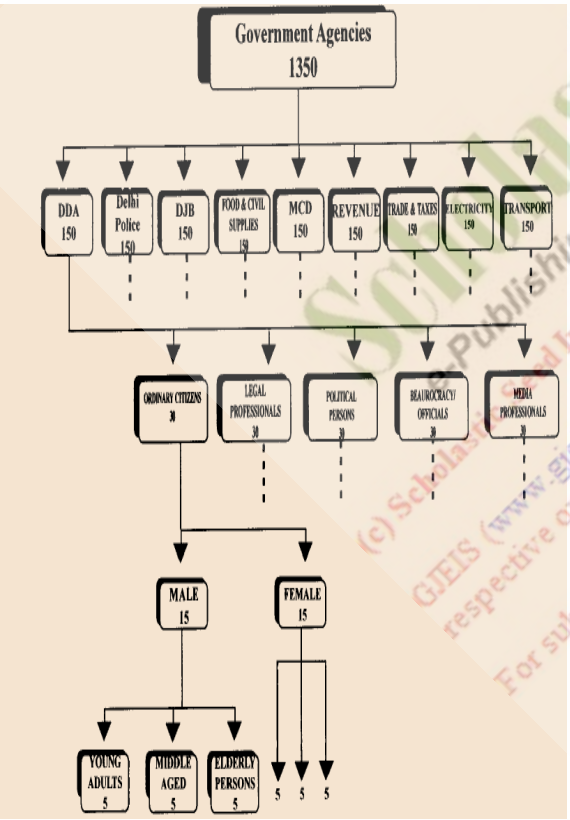


Figure 1: A 9 X5 X 2 X 3 Factorial Designs

THE SAMPLE

The samples were collected from all stakeholder categories. These were collected from five categories i.e. general public/citizen, political person/elected representative, legal professionals/judiciary/advocates, bureaucracy/officials and media & communication professionals. The perception of the stakeholders on their views regarding a particular agency was collected through questionnaires. There are nine agencies of Delhi state, which were considered for seeking opinions. These are Delhi Development Authority/Delhi police/Delhi Jal Board, food and civil supplies department, Municipal Corporation of Delhi, revenue department, trade & taxes department, electricity department & transport department. The responses were obtained for three age groups of individuals. Young adults were considered from18 years to35 years of age. Individuals of age from 36 years to 55 years were kept in middle-aged group. While persons of 56 years and above were kept in elder age group category. Males & females in each stakeholder's categories were also equally represented. The sample distribution for 1350 samples has been given in figure 1. The sample was collected by the researcher along with two professionally qualified research scholars who were also involved with the designing of the research methodology and subsequently were associated in processing and analysis of data.

TOOL

A questionnaire to measure the Impact of Good Governance Initiatives was developed by Lather and Ghonkrokta. The questionnaire contained 35 statements on five point likert scale. These statements for assessment the impact of initiatives taken by government of Delhi were constructed and then collected under 3 categories.

i) Economic Impact Assessment
ii) Social Impact Assessment
iii) Environment Impact Assessment

These were broad categories as stakeholders can feel a visible impact of working procedure and conditions under these three categories broadly. There were eleven statements under economic impact assessment part, 14 statements under social impact assessment, and 10 statements under environment impact assessment. The validity test was done by taking comments from 7 specialists in the field representing 5 categories of stakeholders. There were 2 officials, 2 educationists, 1 from legal field, 1 from

media and 1 from political field. Face validity was assessed after getting the questionnaire examined from experts. The statements were changed as per suggestions so that these are true and complete measurements for that particular impact fields. Test-retest reliability was checked, giving 45 days gap with 30 separate set of stakeholders. The test- retest reliability score of the entire questionnaire was found to be 0.835. The test- retest reliability score for economic impact assessment was found to be 0.76. For environmental impact assessment the reliability score was found to be 0.881 and for social impact assessment it was found to be 0.821.

RESULTS OF ASSESSMENT OF GOOD GOVERNANCE INITIATIVES

Results (Table 1.) shows that these are not significant at 1 % level for any other variables individually but significant at 5% level for sexes only. Two-way interactions are significant for stakeholders and sex and sex and age groups at 1% level. Three way and four ways interaction is also not significant except for interaction of stakeholders, sex and age groups, at 5% level of significance only. Table 1.1 shows that mean score of all the stakeholder's categories is more than 105, which means all the five stakeholder categories are convinced that initiatives taken by agencies to achieve goal of good governance have achieved the goal. Politician females and media professional females have mean score less than 105 which indicate that these two categories of stakeholders do not agree with the contention that initiatives taken by agencies resulted in making governance good. Figure 1 shows that there is great disparity in the opinion expressed by males and females in all categories of except for legal professionals. Males have given more score in the category of politicians, officials and media personals, which mean score of females is more in category of general public. In case of politician and media persons, females have score even less than 105, which mean they do not agree that good governance initiatives resulted in creating impact. Results show that (Table 1.2) that all age groups have mean score more than 105, which means all age groups are convinced that initiatives taken by department resulted in good governance. All interaction categories between stakeholders and age groups have mean score higher than 105 except young media persons (104.74) which clarifies that they consider that initiatives resulted in good governance. Figure 2.2 shows that middle aged citizens, elderly politicians and young legal professionals have a great difference of opinion on good governance initiatives as compared to other age groups of same category of stakeholders. Young media professionals have score less than 105. In case of interaction between sexes and age groups (Table 1.3), mean score is more than 105 in all cases, which explains that males and females in all age groups have agreed that good governance initiatives taken by government in Delhi had positive impact on the lives of the people. However, middle-aged males are most appreciative of this effort as they show highest mean score. The four way interactions have shown the following results (Table 1.4).

i) In case of Delhi Development Authority, young male ordinary citizens, elderly male citizens, elderly legal professionals, middle aged male legal professionals, young female legal professionals, middle aged female officials, elderly female officials, young female media professionals, elderly male media professionals did not agree that initiatives of this agency resulted in improving the lives in Delhi. Rest of the categories agreed that initiatives did impact lives.

ii) In case of Delhi Police, young and elderly male ordinary citizens, young female citizens, young female politicians, middle aged and young male legal professionals, young female media professionals, young and elderly female officials, elderly male and young female media professionals have scored less than 105, thus did not agree that initiatives resulted in having any impact. Rest of the categories agreed.

iii) In case of Delhi Jal Board, young male citizens, young female citizens, young female politicians, middle aged female politicians, elderly male legal professionals, young and elderly female media professionals did not agree that initiatives had impact.

iv) For Food and Civil Supplies, middle aged and elderly male citizens, young and middle aged female politicians, elderly male and young female legal professionals, young female officials, young male media professionals and young and middle aged legal professionals have scored less than 105, which means these categories do not agree that initiatives of department have impact.

v) For Municipal Corporation of Delhi, middle aged and elderly male citizens, young female politicians, young female

legal professionals, young and middle aged female officials, young and middle aged female media professionals did not agree that initiatives taken by Municipal Corporation of Delhi has positive impact on lives of people.

vi) For Revenue department, young and middle aged male citizens, young female citizens, young male politicians, young and middle aged female politicians, all age groups male legal professionals, young female legal professionals, young male and female officials, young male and female media professionals did not agree that policy initiatives of Revenue department had positive impact.

vii) In case of department of Trade and Taxes, elderly male citizens, all age group female politicians, middle aged and elderly male legal professionals, young female legal professionals and young female media professionals are not convinced that initiatives of department have any impact.

viii) In case of Electricity department, elderly female citizens, young and middle aged political persons, elderly female legal professionals and young female media professionals are the categories which do not agree that steps taken by the department had positive impact.

ix) For Transport department, young female citizens, all age group political persons females, elderly male legal professionals and young female media professionals have not agreed with the contention that initiatives taken by Transport department resulted in having positive impact.

x) Overall assessment of the impact of initiatives of department on the economic, social and environmental conditions of people makes it clear that stakeholders are convinced that all other agencies except Revenue department had a positive impact on the lives of people in Delhi.

xi) The ranking of agencies on the evaluation of impact of initiatives is as follows:

1) Delhi Jal Board, 2) Transport Department, 3) Electricity Department, 4) Trade and Taxes Department, 5) Food and Civil Supplies Department, 6) Delhi Development Authority, 7) Delhi Police, 8) Municipal Corporation of Delhi and 9) Revenue Department.

Table1: Summary of Analysis of Variance for Assessment of Good Governance Initiatives

Source of Variation	SS	df	MSS	F	p
Department (A)	8016.29	8	1002.03	1.80	NS
Stakeholders (B)	5084.42	4	1271.10	2.29	NS
Gender (C)	2796.48	1	2796.48	5.04	>.05
Age Group (D)	1135.64	2	567.82	1.02	NS
A X B	10890.34	32	340.32	0.61	NS
A X C	7338.16	8	917.27	1.65	NS
A X D	11197.04	16	699.81	1.26	NS
B X C	17576.42	4	4394.10	7.93	>.01
B X D	8676.28	8	1084.53	1.95	>.05
C X D	14164.96	2	7082.48	12.78	>.01
A X B X C	12471.09	32	389.72	0.70	NS
A X B X D	15584.22	64	243.50	0.43	NS
A X C X D	5811.41	16	363.21	0.65	NS
B X C X D	9901.58	8	1237.69	2.23	>.05
A X B X C X D	38506.94	64	601.67	1.08	NS
Within treatment	598186.40	1080	553.87		

Table 1.1 TABLES OF MEANS for (Stakeholder (B) X Gender (C)

	C1	*C2*	*MEANS OF B*
B1	106.62	116.43	111.52
B2	115.04	104.78	109.91
B3	110.97	111.11	111.04
B4	115.77	109.42	112.60
B5	110.80	103.05	106.92
MEANS OF C	111.84	108.96	

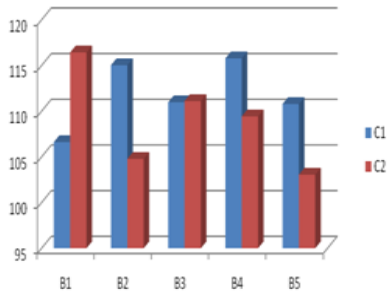


Figure 2.1: Mean score of male and female stakeholders on Good Governance Initiatives

Table 1.2 TABLE OF MEANS for Stakeholder (B) X Age Group (D)

	D1	D2	D3	
B1	108.68	117.39	108.52	111.53
B2	108.60	108.68	112.47	109.91
B3	115.17	111.32	106.66	111.05
B4	111.94	112.49	113.38	112.60
B5	104.34	108.63	107.81	106.93
	109.75	111.70	109.77	

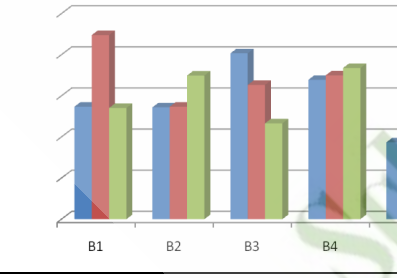


Figure 2.2 : Mean score of young, middle aged and elderly stakeholders on Good Governance Initiatives

Table 1.3 TABLE OF MEANS for Gender (C) X Age Group (D)

CD TABLE OF MEANS					
	C1			**C2**	
D1	**D2**	**D3**	**D1**	**D2**	**D3**
114.28	114.52	106.73	105.21	108.88	112.8

ABCD TABLE OF MEANS

			A1	A2	A3	A4	A5	A6	A7	A8	A9
B1	C1	D1	94.4	101.4	104	115.6	104.4	92	118.8	106.4	123.8
		D2	109.6	120	132.6	100.8	99.8	103.6	127.2	115.6	118.6
		D3	96	96.4	115.2	88.8	95.8	93.8	98.4	91	114.8
	C2	D1	134	96	104.4	118	105.2	103.4	116.2	121	97.2
		D2	116	110.2	120.6	137.2	109.8	126.8	126.8	113.8	124
		D3	116	117.6	117.6	123	118.6	117.6	117.6	117.6	117.6
B2	C1	D1	116.8	116.8	116	116.8	116.8	89	116.8	116.6	116.0
		D2	116	111.6	116	116.2	115	116	116.8	116	116.2
		D3	116	116	116	116.4	116	115	116	117	116
	C2	D1	125.8	100.8	101.4	100.2	100.8	100.6	100.8	100.4	100.8
		D2	112.2	114.2	96.4	96.4	107.4	96.4	100.8	96.4	96.4
		D3	111.2	112.8	111.6	108.6	112.2	113.6	96.4	117.6	96.4
B3	C1	D1	128.8	128.8	120	131.6	120	89.2	123.6	121.6	131.6
		D2	103.2	102.8	117.4	114.8	111.4	103.2	103.2	129.6	114.8
		D3	96.4	96.4	96.4	96.4	113.2	96.4	96.4	112.8	96.4
	C2	D1	103.6	103.6	127.2	103.6	103.6	103.6	103.6	114.4	114.6
		D2	114.8	110.2	106	109.2	117.6	111.8	111.2	111.8	110.8
		D3	116	113.4	116	116	112.4	116	116.8	96.4	116
B4	C1	D1	116	116.6	119	120	119.2	81.4	110.6	105.2	131.6
		D2	108.6	116.4	130.6	129.4	118.4	120	119	123.4	119.6
		D3	112.6	110.4	105.2	121.2	111.4	115.2	124.8	109.8	110.4
	C2	D1	115.8	103.8	136	102	91	89.4	108.4	129.2	119.8
		D2	92.2	76.6	110.6	111.2	101.6	110.6	110.6	114.8	111.2
		D3	117	106.6	116.8	111.2	110.4	117.6	108.2	116	116
B5	C1	D1	111.4	129.4	123.4	104.6	110	93.8	124.4	124.6	122.8
		D2	109.2	110	108.2	111.8	116.2	109.6	110.6	110.4	114.2
		D3	97.8	103.2	106	106	106	106	110.4	105.4	106.2
	C2	D1	87.8	99	88	96.6	96	96	88.8	91.2	90.4
		D2	111.6	111.8	101	95.2	91.2	110.6	111.2	111.8	110.8
		D3	116.2	107.2	106.8	112.8	105.4	110.2	109.8	115.6	109.6
Total Means			110.767	108.6667	112.88	111.0333	108.5933	104.9867	111.4467	112.4333	112.84

CONCLUSION

Based on the above discussion the following can be concluded.

A) This study does not testifies that there is difference in the perception of the stakeholders on the assessment of the socio-economic & environmental impact on the lives of the people in state of Delhi resulted due to the good governance initiatives taken by different government agencies of Delhi state as the results were not significant.

B) This study does not confirm that there is difference in the perception of the different categories of stakeholders i.e. general public/citizens, political persons/elected representatives, legal professional/judiciary/advocates, bureaucracy/officials and media & communication professionals on the assessment of the socio-economic & environmental impact on the lives of the people in state of Delhi resulted due to the good governance initiatives taken by different government agencies of Delhi state as results were non significant. However, all stakeholders' i.e. ordinary citizens, politicians, legal professionals, media professionals and officials agree that good governance initiatives taken by government agencies in Delhi resulted in the development process (good governance). (Table 5.1).

C) This study confirms that there is no difference in the perception of stakeholders of different age groups i.e. young adults (18-35 years), middle aged (36-55 years and elderly (56 & above years) on the assessment of socio-economic & environmental impact on the lives of the people in state of Delhi resulted due to the good governance initiatives taken by different government agencies of Delhi State as results were not significant.

D) This study testifies that there is no difference in the perception of stakeholders of both the sexes on the assessment of socio-economic & environmental impact on the lives of the people in state of Delhi resulted due to the good governance initiatives taken by different government agencies of Delhi state as results were not significant at 1% level of significance, however it was significant at 5% level of significance. Males and females collectively as group are convinced that initiatives of departments resulted in good governance (Table 5.1).

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MIS Sustain Credit Riskmetrics Vis a Vis the Future of Indian Banking System

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ABSTRACT

The Indian Economy is booming on the back of strong economic policies and a healthy regulatory regime. The effects of this are far-reaching and have the potential to ultimately achieve the high growth rates that the country is yearning for. The banking system lies at the nucleus of a country's development robust reforms are needed in India's case to fulfill that. The BASEL III accord from the Bank of International Settlements attempts to put in place sound frameworks of measuring and quantifying the risks associated with banking operations by 2019.

The paper seeks to showcase the changes that will emerge as a result of banks adopting the international norms and whether they will be able to sustain the pressures and shocks of the changing scenarios. This enables one to discern the complete scenario that will emerge in the years ahead. The Risk Management scenario will strengthen owing to the liberalization, regulation and integration with global markets. Management of risks will be carried out proactively and quality of credit will improve, leading to a stronger financial sector.
The authors have emphasized the dire need of Altmann Z Score, Merton Model, KMV Model and Value at Risk Model for the Banks in a more sophisticated manner through caselets.

Thus the Banks would evolve to be a complete and pure financial services provider, catering to all the financial needs of the economy in the Vision 2020. Flow of capital will increase and setting up of bases in foreign countries will become commonplace.

KEYWORDS

Risk metrics	KMV Model
Banking System	EAD – Exposure at default
Expected Loss [EL]	Probability of Default [PD]
Capital Adequacy Requirement [CAR]	Loss given default [LGD]

EMPIRICAL ARTICLE

PREAMBLE

Risk management has assumed increased importance from the regulatory compliance point of view. Credit Risk being an important component of risk, can be viewed at two levels - at the level of an individual asset or exposure and at the portfolio level. Credit risk management tools therefore have to work at both individual and portfolio levels. Traditionally the tools of credit risk management include loan policies, standards for presentation of credit proposals, delegation of loan approving powers, multi-tier credit approving systems, prudential limits on credit exposures to companies and groups, stipulation of financial covenants, standards for collaterals, limits on asset concentrations and independent loan review mechanisms. Monitoring of non-performing loans has however a focus on remedy rather than advance warning or prevention. Banks assign internal ratings to borrowers, which will determine the interest spread charged over PLR. These ratings are also used for monitoring of loans. Some central banks like the Reserve Bank of India have suggested the use of rating models like Altman's Z score models at individual loan/company level and risk models like Credit Metrics and Credit Risk+ at the portfolio level.

OVERVIEW

Credit Risk is defined as "The inability or unwillingness of the customer or counter party to meet commitments in relation to lending, hedging, settlement and other financial transactions." Hence Credit Risk emanates when the counter party is unwilling or unable to meet or fulfill the contractual obligations / commitments thereby leading to defaults. Risk management activities will be more pronounced in future banking because of liberalization, deregulation and global integration of financial markets. This would be adding depth and dimension to the banking risks. As the risks are correlated, exposure to one risk may lead to another risk, therefore management of risks in a proactive, efficient & integrated manner will be the strength of the successful banks. In the current norms of Basel II accord, under Pillar 1, the framework offers three distinct options for computing capital requirement for credit risk. These approaches for credit risks are based on increasing risk sensitivity and allow banks to select an approach that is appropriate to the stage of development of bank's operations. The approaches available for computing capital for credit risk are Standardized Approach, Foundation Internal Rating Based Approach and Advanced Internal Rating Based approach.

Standardized Approach is the basic approach which banks at a minimum have to use for moving to Basel II implementation. It is an extension of the existing method of calculation of capital charge for credit risk. The existing method is refined and made more risk sensitive by:

- Introducing more number of risk weights thus aiding finer differentiation in risk assessment between asset groups.
- Assignment of Risk weights based on the ratings assigned by External Credit rating agencies recognized by RBI, in case of exposures more than Rs.5 crores.
- Recognizing wide range of collaterals (securities) as risk mitigants and netting them off while determining the exposure amount on which risk weights are to be applied.
- Introducing Retail portfolio with total exposure up to Rs.5 crores and yearly turnover less than Rs.50 crores as a separate asset group with clear cut definition and criteria.
- Assignment of Risk weight for NPA accounts. The rating assigned by the eligible external credit rating agencies will largely support the measure of credit risk. Unrated exposures will normally carry 100% risk weight. But for the financial year 2008-09, all fresh sanctions or renewals in respect of unrated borrowers in excess of Rs.50 crores will attract a risk weight of 150%. From 2009-

10 onwards, unrated borrowings in excess of 10 crores will attract risk weight of 150%.

The standardized approach was implemented by 31st March 2010, and the forward-looking banks would be in the process of placing their MIS for the collection of data required for the calculation of Probability of Default (PD), Exposure at Default (EAD) and Loss Given Default (LGD). The banks are expected to have at a minimum PD data for five years and LGD and EAD data for seven years.

CRM{ Credit Risk Mitigation} refers to permitted methods of netting the exposure value for computing Risk Weights by using Collateral, Third party guarantee (Guarantee) and On-balance sheet netting. CRM is available subject to several conditions. Before netting, Exposure Value (EV) and Collateral Value (CV) are to be adjusted for volatility and possible future fluctuations. EV to be increased for volatility (premium factor) and CV to be reduced for volatility (discount factor). These factors are termed as 'Haircuts' (HC).

Therefore,

$$\text{EV after risk mitigation} = (\text{EV After HC} - \text{CV After HC})$$

EV after Risk mitigation will be multiplied by the Risk Weight of the customer to obtain Risk-weighted asset amount for the collateralized transaction.

Presently most Indian banks do not possess the data required for the calculation of their LGDs. Also the personnel skills, the IT infrastructure and MIS at the banks need to be upgraded substantially if the banks want to migrate to the IRB Approach.

However, for banks and financial institutions, credit risk is the most important factor to be managed. Credit risk may take various forms, such as:

- ✓ In the case of **direct lending, that funds will not be repaid;**
- ✓ **In the case of guarantees or letters of credit, that funds will not be forthcoming from the customer upon crystallization of the liability under the contract;**
- ✓ **In the case of treasury products, that the payment or series of payments due from the counterparty under the respective contracts is not forthcoming or ceases;**
- ✓ **In the case of securities trading businesses, that settlement will not be effected;**
- ✓ **In the case of cross-border exposure, that the availability and free transfer of currency is restricted or ceases.**

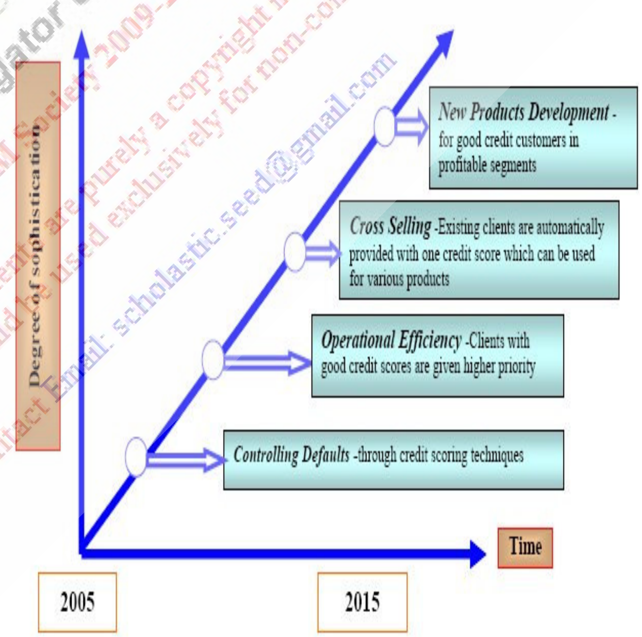

Figure 1: Strategic Continuum of Risk Scoring Models

Source:- http://www.moodyskmv.com

Figure-1: Strategic Continuum of Risk Scoring Models

EMPIRICAL ARTICLE

The more diversified a banking group is, the more intricate systems it would need, to protect itself from a wide variety of risks. These include the routine operational risks applicable to any commercial concern, the business risks to its commercial borrowers, the economic and political risks associated with the countries in which it operates, and the commercial and the reputational risks concomitant with a failure to comply with the increasingly stringent legislation and regulations surrounding financial services business in many territories. Comprehensive risk identification and assessment are therefore very essential to establishing the health of any counterparty.

COMPONENTS OF CREDIT RISK

As per the existing Standardized approach, Risk Weight (RW) is assigned based on the "External Rating" of the borrowers for "Corporate" asset class and differential (concessional) risk weight of 75% is applicable for "Retail" exposures. Basel Committee taking into account the following elements has determined the risk weights:

- **Frequency of Default (Probability of Default – PD)**
- **Severity of Default (Loss Given Default – LGD)**
- **Outstanding/modifiers for off balance sheet items (Exposure at Default)**
- **Maturity adjustment (M)**

More advanced approaches provide banks with the following two options for measurement of credit risk:

1. Foundation – Internal Rating Based (FIRB) - Under the **foundation approach**, as a general rule, banks provide their own estimates of PD and rely on supervisory estimates for other risk components.
2. Advanced – Internal Rating Based (AIRB) - Under the **advanced approach**, banks provide more of their own estimates of PD, LGD and EAD, and their own calculation of M, subject to meeting minimum standards.

Ideally, the more suited approach shall be AIRB as under FIRB, the regulator provides LGD and EAD and it may not be appropriate to calibrate and benchmark these risk components to our portfolios.

AIRB is a highly data intensive approach and requires granular level information on all the aforesaid risk elements. The minimum number of years for which the historical data is to be collected, analysed, calibrated and validated for measurement of capital adequacy is specified below:

- **PD: 5 yrs**
- LGD and EAD: 7 yrs
- Maturity: Effective maturity based on cash flows

Basel II guidelines stipulates that the risk elements shall cover one full economic cycle so as to iron out the fluctuations in its measurement and computing capital adequacy in a more meaningful manner while possibly covering the economic downturn.

SUMMARIZING THE CREDIT RISK MODELS

1. KMV MODEL

This model was developed by KMV Corporation based on Merton's (1973) analytical model of firm's value. This model uses stock prices and the capital structure of the firm to estimate its probability. The starting point of this model is the proposition that a firm would default only if its asset value falls below certain level (default point), which is a function of its liability. It estimates the asset value of the firm and its asset volatility from the market value of equity and the debt structure in the opinion theoretic framework. Using these two values, a metric (distance from default or DFD) is constructed that represents the number of standard deviation that the

firm's asset value is away from the default point. Finally, a mapping is done between the default values and actual default rate, based on historical default experience. The resultant probability is called Expected Default Frequency (EDF). Thus EDF is calculated in the following three steps:

i.	**Estimation of asset value and asset volatility from equity value and volatility of equity return.**
ii.	**Calculation of DFD as (Asset value – Default point) / (Asset value * Asset volatility)**
iii.	**Calculation of expected default frequency.**

2. CREDIT METRICS MODEL

Credit Metrics is a statistical model developed by J.P Morgan, the investment bank, in the year 1995 for internal use, but now it's being used all around the world by hundreds of banks including Indian banks like the ICICI bank. This model works on the statistical concepts like probability, means, and standard deviation, correlation, and concentrations.

Credit Metrics is a tool for assessing portfolio risk due to changes in debt value caused by changes in obligor credit quality. This model includes the changes in value caused not only by possible default events, but also by upgrades and down grades in credit quality, because the value of a particular credit varies with the corresponding credit quality. Credit Metrics also assess the Value- at – risk (VAR) – the volatility of value- not just the expected losses. The model assesses the risk within the full context of a portfolio addressing the correlation of credit quality moves across obligors. This allows to directly calculating the diversification benefits or potential over concentrations across the portfolio.

The transition table for the various categories of bonds is determined and then joint probability for both these under different combinations. Then the NPV of the portfolio is determined for all the combinations and a probability distribution is constructed. These probabilities are actually an analysis of past migrations and same is the case with default probability. In the case of default a recovery rate is taken as the portfolio value. This distribution gives us 2 measures of credit risk: standard deviation and percentile level. This model has some limitations regarding the data availability but it doesn't require any changes as such for application in the Indian scenario.

3. VAR MODEL

This model is being used in some of the banks currently in India. Value at risk (VAR) is a statistical risk measure, which is used extensively for measuring the market risk of portfolios of assets and/or liabilities. Suppose a portfolio's value at risk is 2Mn$ with a 95% confidence level, then it means that the portfolio is expected to loose a maximum of 2Mn$ 95% of the times. The Value at risk is calculated by constructing a probability distribution of the portfolio values over a given time horizon. The values may be calculated on the daily, weekly or monthly basis.

4. ALTMANN Z SCORE

Altman's Z score predicts whether or not a company is likely to enter into bankruptcy within one or two years. Edward Altman developed the model by examining 85 manufacturing companies in the year 1968. Later, additional "Z-Scores" were developed for private manufacturing companies (Z-Score - Model A) and another for general/service firms (Z-Score - Model B). The Z-Score combination. The algorithm has been consistently reported to have a 95 % accuracy of prediction of bankruptcy up to two years prior to failure on nonmanufacturing firms as well. There have been many other bankruptcy predictors developed and published. However, none has been so thoroughly tested and broadly accepted as the Altman Z-Score. The Altman Z-Score variables influencing the financial strength of a firm are: current assets, total assets, net sales, interest, total liability, current liabilities, market value of equity, earnings before taxes and retained earnings.

The model can be used for a quick check about the health of a company. It however cannot be used for individuals. The value of Z is given by the following equation:

$$Z = 0.012X1 + 0.014X2 + 0.033X3 + 0.006X4 + 0.999X5$$

Where,

X1 = working capital/Total assets
X2 = Retained earnings/Total assets
X3 = Earnings before interest and taxes/Total assets
X4 = Market value of equity/Book value of total liabilities
X5 = Sales/Total assets

A "Z" value above 1.8 is supposed to be quite safe, while the value below 1.8 indicates a high probability of bankrupt

CREDIT STRATEGY, POLICIES AND PROCEDURES

The credit risk strategy should provide continuity in approach, and will need to take into account the cyclical aspects of any economy and the resulting shifts in the composition and quality of the overall credit portfolio. This strategy should be viable in the long run and through various credit cycles. An organisation's risk appetite depends on the level of capital and the quality of loan book and the magnitude of other risks embedded in the balance sheet. Based on its capital structure, a bank will be able to set its target returns to its shareholders and this will determine the level of capital available to the various business lines.

Keeping in view the foregoing, a bank should have the following in place: -

i. Dedicated policies and procedures to control exposures to designated higher risk sectors such as capital markets, aviation, shipping, property development, defence equipment, highly leveraged transactions, bullion etc.
ii. Sound procedures to ensure that all risks associated with requested credit facilities are promptly and fully evaluated by the relevant lending and credit officers.
iii. Systems to assign a risk rating to each customer/borrower to who credit facilities have been sanctioned.
iv. A mechanism to price facilities depending on the risk grading of the customer, and to attribute accurately the associated risk weightings to the facilities.
v. Efficient and effective credit approval process operating within the approval limits authorized by the Boards.
vi. Procedures and systems which allow for monitoring financial performance of customers and for controlling outstanding within limits.
vii. Systems to manage problem loans to ensure appropriate restructuring schemes. A conservative policy for the provisioning of non-performing advances should be followed.
viii. A process to conduct regular analysis of the portfolio and to ensure on-going control of risk concentrations.

The credit policies and procedures should necessarily have the following elements: -

i.	Banks should have written credit policies that define target markets, risk acceptance criteria, credit approval authority, credit origination and maintenance procedures and guidelines for portfolio management and remedial management.
ii.	Banks should establish proactive credit risk management practices like annual / half yearly industry studies and individual obligor reviews, periodic credit calls that are documented, periodic plant visits, and at least quarterly management reviews of troubled exposures/weak credits.
iii.	Business managers in banks will be accountable

	for managing risk and in conjunction with credit risk management framework for establishing and maintaining appropriate risk limits and risk management procedures for their businesses.
iv.	Banks should have a system of checks and balances in place around the extension of credit which are:
v.	An independent credit risk management function
vi.	Multiple credit approvers
vii.	An independent audit and risk review function
viii.	The Credit Approving Authority to extend or approve credit will be granted to individual credit officers based upon a consistent set of standards of experience, judgment and ability.
ix.	The level of authority required to approve credit will increase as amounts and transaction risks increase and as risk ratings worsen.
x.	Every obligor and facility must be assigned a risk rating.
xi.	Banks should ensure that there are consistent standards for the origination, documentation and maintenance for extensions of credit.
xii.	Banks should have a consistent approach toward early problem recognition, the classification of problem exposures, and remedial action.
xiii.	Banks should maintain a diversified portfolio of risk assets in line with the capital desired to support such a portfolio.
xiv.	Credit risk limits include, but are not limited to, obligor limits and concentration limits by industry or geography.
xv.	In order to ensure transparency of risks taken, it is the responsibility of banks to accurately, completely and in a timely fashion, report the comprehensive set of credit risk data into the independent risk system.

TYPICAL ORGANISATIONAL STRUCTURE

At organizational level, overall risk management should be assigned to an independent Risk Management Committee or Executive Committee of the top Executives that reports directly to the Board of Directors. The purpose of this top level committee is to empower one group with full responsibility of evaluating overall risks faced by the bank and determining the level of risks which will be in the best interest of the bank. The function of Risk Management Committee should essentially be to identify, monitor and measure the risk profile of the bank. The Committee should also develop policies and procedures, verify the models that are used for pricing complex products, review the risk models a development takes place in the markets and also identify new risks. Internationally, the trend is towards assigning risk limits in terms of portfolio standards or Credit at Risk (credit risk) and Earnings at Risk and Value at Risk (market risk).

A prerequisite for establishment of an effective risk management system is the existence of a robust Management Information System (MIS), consistent in quality. The existing MIS, however, requires substantial up gradation and strengthening of the data collection machinery to ensure the integrity and reliability of data. The risk management is a complex function and it requires specialized skills and expertise. Banks have been moving towards the use of sophisticated models for measuring and managing risks. Large banks and those operating in international markets should develop internal risk management models to be able to compete effectively with their competitors.

As the domestic market integrates with the international markets, the banks should have necessary expertise and skill in managing various types of risks in a scientific manner. At a more sophisticated level, the core staff at Head Offices should be trained in risk modeling and analytical tools. It should, therefore, be the endeavor of all banks to upgrade the skills of staffs.

Given the diversity of balance sheet profile, it is difficult to adopt a uniform framework for management of risks in India. The design of risk management functions should be bank specific, dictated by the size, complexity of functions, the level of technical expertise and the quality of MIS. The proposed guidelines only provide broad parameters and each bank may evolve their own systems compatible to their risk management architecture and expertise.

Internationally, a committee approach to risk management is being adopted. While the **Asset-Liability Management Committee (ALCO)** deals with different types of market risk, **the Credit Policy**

Committee (CPC) oversees the credit/counterparty risk and country risk.

Banks could also set up a single Committee for integrated management of credit and market risks. Generally, the policies and procedures for market risk are articulated in the ALM policies and credit risk is addressed in Loan Policies and procedures.

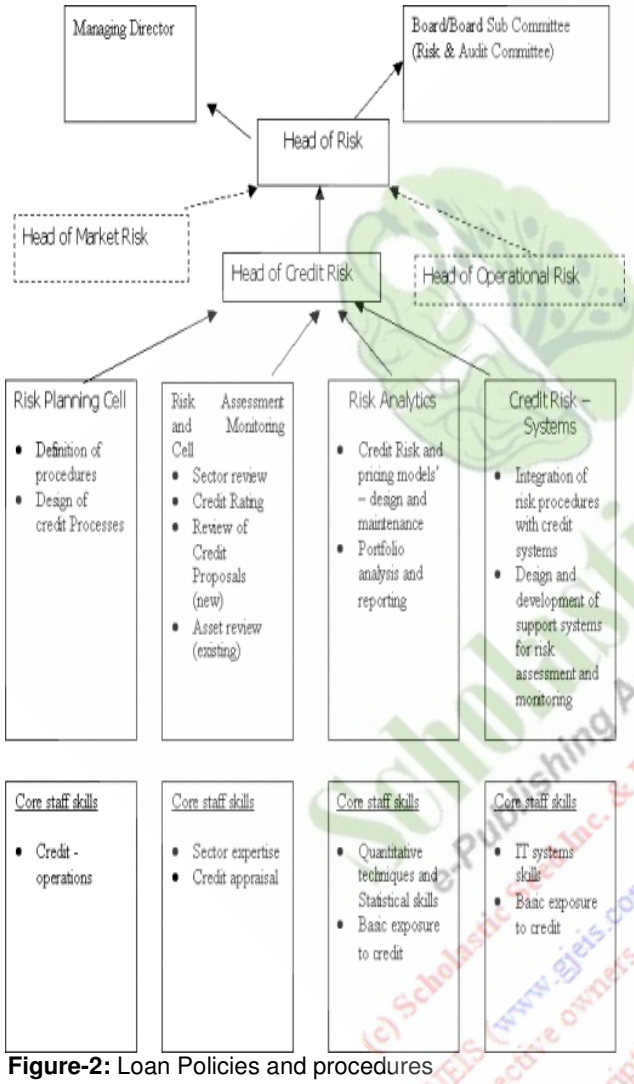

Figure-2: Loan Policies and procedures

Currently, while market variables are held constant for qualifying credit risk, credit variables are held constant in estimating market risk. The economic crises in some of the countries have revealed a strong correlation between unhedged market risk and credit. Forex exposures, assumed by corporate whi have no natural hedges, will increase the credit risk which banks run vis-à-vis their counterparties. The volatility in the prices of collateral also significantly affects the quality of the loan book. Thus, there is a need for integration of the activities of both the ALCO and the CPC and consultation process is established to evaluate the impact of market and credit risks on the financial strength of banks. Banks may also consider integrating market risk elements into their credit risk assessment process.

MEASUREMENT OF RISK THROUGH CREDIT RATING/SCORING:

a. Quantifying the risk through estimating expected loan losses i.e. the amount of loan losses that bank would experience over a chosen time horizon (through tracking portfolio behavior over 5 or more years) and unexpected loss (through standard deviation of losses or the difference between expected loan losses and some selected target credit loss quantile);
b. Risk pricing on a scientific basis; and
c. Controlling the risk through effective Loan Review Mechanism and portfolio management.

The credit risk management process should be articulated in the bank's **Loan Policy**, duly approved by the Board. Each bank should constitute a high level **Credit Policy Committee**, also called Credit Risk Management Committee or Credit Control Committee etc. to deal with issues relating to credit policy and procedures and to analyze, manage and control credit risk on a bank wide basis. The Committee should be headed by the Chairman/CEO/ED, and should comprise heads of Credit Department, Treasury, Credit Risk Management Department (CRMD) and the Chief Economist. The Committee should, *inter alia*, formulate clear policies on standards for presentation of credit proposals, financial covenants, rating standards and benchmarks, delegation of credit approving powers, prudential limits on large credit exposures, asset concentrations, standards for loan collateral, portfolio management, loan

review mechanism, risk concentrations, risk monitoring and evaluation, pricing of loans, provisioning, regulatory/legal compliance, etc.

Concurrently, each bank should also set up Credit Risk Management Department (CRMD), independent of the Credit Administration Department. The CRMD should enforce and monitor compliance of the risk parameters and prudential limits set by the CPC. The CRMD should also lay down risk assessment systems, monitor quality of loan portfolio, identify problems and correct deficiencies, develop MIS and undertake loan review/audit. Large banks may consider separate set up for loan review/audit. The CRMD should also be made accountable for protecting the quality of the entire loan portfolio. The Department should undertake portfolio evaluations and conduct comprehensive studies on the environment to test the resilience of the loan portfolio.
Credit Risk may be defined as the risk of default on the part of the borrower. The lender always faces the risk of the counter party not repaying the loan or not making the due payment in time. This uncertainty of repayment by the borrower is also known as default risk.

The credit approval process should aim at efficiency, responsiveness and accurate measurement of the risk. This will be achieved through a comprehensive analysis of the borrower's ability to repay, clear and consistent assessment systems, a process which ensures that renewal requests are analyzed as carefully and stringently as new loans and constant reinforcement of the credit culture by the top management team.

Banks must have a MIS, which will enable them to manage and measure the credit risk inherent in all on- and off-balance sheet activities. The MIS should provide adequate information on the composition of the credit portfolio, including identification of any concentration of risk. Banks should price their loans according to the risk profile of the borrower and the risks associated with the loans.

The broad objectives of studying the Credit risk Management evolving the Bank's credit risk policy are:

OBJECTIVES OF THE STUDY

- To build a high quality portfolio in line with the Bank's risk appetite and strategy.
- To identify, measure, monitor, manage and control risk effectively and to ensure that the Bank gets compensated for the risk assumed
- To maximize Bank's Risk-Adjusted Return by maintaining credit risk exposure within acceptable parameters.
- To develop a greater ability to recognize and avoid potential problems.
- To support sustainable business growth within the overall Risk appetite of the Bank.
- Diversifying the risk profile among different segments of Products, Geographies, Group etc in order to minimise the concentration risk and maximise returns.

SCOPE

The scope of our study is to build a high quality portfolio in line with the Bank's risk appetite and strategy and to support sustainable business growth within this appetite. By building upon the model of transition matrix we have tried to identify measure, monitor, manage and control risk effectively and to ensure that the Bank gets compensated for the risk assumed. Diversifying the risk profile among different segments of Products, Geographies, Group etc in order to minimise the concentration risk and maximise returns and to maximize Bank's Risk-Adjusted Return by maintaining credit risk exposure within acceptable parameters.

METHODOLOGY

The authors have devised Credit Risk Transition matrix in a New Generation Private Sector Bank

{IndusindBank} which can help as against qualitative/ structural approaches as follows:

TRANSITION MATRIX

Default probability is measured using risk factors. The change in the default probability or the volatility in PD is measured through Transition Matrix (TM) While PD measurement helps in measuring risk at the instrument level, PD volatility helps in measuring risk at the portfolio level. The likelihood of a customer migrating from its current risk-rating category to any other category within the time horizon is frequently expressed in terms of rating TM. TM is expressed in a Matrix form.

The transition matrix including probabilities to move from one rating to another rating represents the kernel of many credit risk and rating calculations. Following the requirements of Basel II financial engineers need software tools allowing for adjustment of transition matrices provided by rating agencies to the economic cycles and to generate transition matrices according to the local financial and economic conditions. The generated transition matrixes are the basis for calculation of credit risk of counterparts using a set of internal (Credit Metrics, Credit Risk and Basel II Standard, Foundation and Advanced Approaches) evaluation models. The estimation of credit risk involve cumulative and marginal default probabilities for future periods used to calculate expected and unexpected losses (Credit VAR) within a multi-period credit exposure model. The results of transition matrix estimation of Data Supporter Module are used by Risk Evaluator to calculate credit risk of single counterparts and various aggregates based on sub portfolios, concern structures and other grouping criteria such as branches and countries.

One limitation of this method is the size of the pools. Most banks do not have large enough credit portfolios to be able to estimate PDs with accurate granularity. The smaller number of obligors, the more volatile the PD estimation will be.

Another limitation is given if PDs are calculated once a year (at year end); changes in the PDs cannot be foreseen in time. A monthly estimation and comparison of PDs on a year-to-year basis is therefore helpful to extend the time series and calculate the credit risk and expected losses on current data.

Using the method of pseudo-pooling, banks can compute transition probabilities or cumulated multi-year PD. For multi-year estimations, it is crucial that the pool remains "static" or "frozen" with respect to the obligors in it, so that the time period is equal for all the obligors in the respective pool. In other words, it will be incorrect – say 5-year PDs, if some obligors have been in the pool for 5 years and some for only 4 or 3 years. However to overcome this problem two types of pools are used-

1. Dynamic pool

A dynamic pool of a year is a set of pool of companies where in the membership of the pool does not remain static/constant but keeps on changing based on additions and withdrawals from the pool. Here the companies which withdraw or default in between will be considered and not be taken as addition or outstanding. That is why it is known as dynamic pool.

Unlike the static pool the ratings are not constant throughout the period. It will be dynamic or flexible in nature

2. Static pool

A static pool of a year is a set or pool of companies having an outstanding rating at the beginning of the year. The membership of the pool remains static /constant over a period of time. For a company to be

included in an n year static pool, it has to be outstanding throughout those entire n years. Companies that withdraw or default in between will remain withdrawn of defaulted for the remaining years. A company that gets a rating subsequently, or recovers from default, is considered a new company in that static pool. A company that remains rated for more than one year is counted as many times as number of years over which it was rated. This assumes all ratings are kept current through an on going surveillance process.

Process of Static Pool

- The no of columns for static pools will depend upon the start year, end year and the minimum horizon.
- The software should count the number of rated accounts under each category, for a finalized assessment done between two particular dates.
- If there is any case, which has be clicked for "Default" the ratings of those accounts should not be included in the static pool. Similarly any withdrawn cases should also be excluded from the count.
- If there are more than 1 finalized assessment for a particular case the rating of that assessment which has the latest Assessment date should be considered for counting.
- After Static Pool we have to observe the behavior of the company i.e. the Transition of the company for the defined horizon.

Table 1. Rating migrations over a period of 4 years for capital broker model

Customer ID	Year 1	Year 2	Year 3	Year 4
CAPITAL 1	B 2	B 3	B 3	B 3
CAPITAL 2	B 5	D	D	D
CAPITAL 3	B 1	B 1	B 1	B 1
CAPITAL 4	B 2	B 2	B 2	B 2
CAPITAL 5	B 3	B 2	B 2	B 2
CAPITAL 6	B 2	B 2	B 2	B 2
CAPITAL 7	B 7	B 7	B 6	B 7
CAPITAL 8	B 1	B 1	B 2	B 2
CAPITAL 9	B 2	B 2	B 2	B 2
CAPITAL 10	B 3	B 3	B 2	B 2
CAPITAL 11	B 7	B 7	B 7	B 7
CAPITAL 12	B 2	B 2	B 3	B 3
CAPITAL 13	B 4	W	W	W
CAPITAL 14	B 3	B 3	B 3	B 3
CAPITAL 15	B 2	B 2	B 2	B 2
CAPITAL 16	B 2	B 2	B 2	B 2
CAPITAL 17	B 8	B 8	B 8	B 8
CAPITAL 18	B 4	B 4	B 3	B 3
CAPITAL 19	B 2	B 2	B 2	B 2
CAPITAL 20	B 5	B 5	B 5	B 5
CAPITAL 21	B 3	B 3	B 3	B 3
CAPITAL 22	B 4	B 4	B 4	B 4
CAPITAL 23	B 2	B 2	B 2	B 3
CAPITAL 24	B 3	B 3	B 3	B 2
CAPITAL 25	B 4	B 4	B 3	B 3
CAPITAL 26	B 1	B 1	B 1	B 1
CAPITAL 27	B 4	B 5	B 5	B 5
CAPITAL 28	B 6	B 6	W	W
CAPITAL 29	B 5	B 5	B 4	B 4
CAPITAL 30	B 6	B 6	B 6	B 6
CAPITAL 31	B 3	B 3	B 3	B 3
CAPITAL 32	B 7	B 7	B 7	B 7
CAPITAL 33	B 1	B 1	B 1	B 1
CAPITAL 34	B 5	B 5	B 5	B 5
CAPITAL 35	B 4	B 4	B 4	B 5
CAPITAL 36	B 3	B 3	B 4	B 4
CAPITAL 37	B 6	B 7	D	D
CAPITAL 38	B 5	B 5	B 5	W

CAPITAL 39	B 8	D	D	D
CAPITAL 40	B 6	B 6	B 6	B 6
CAPITAL 41	B 6	B 6	B 6	B 6
CAPITAL 42	B 8	B 8	B 8	D
CAPITAL 43	B 3	B 3	B 3	B 3
CAPITAL 44	B 4	B 4	B 4	B 4
CAPITAL 45	B 1	B 1	B 1	B 1
CAPITAL 46	B 5	B 5	B 6	B 6
CAPITAL 47	B 7	D	D	D
CAPITAL 48	B 1	B 3	B 3	B 3
CAPITAL 49	B 1	B 1	B 1	B 1
CAPITAL 50	B 1	B 1	B 1	B 1
CAPITAL 51	B 1	B 1	B 1	B 1
CAPITAL 52	B 1	B 1	B 1	B 1
CAPITAL 53	B 1	B 1	B 1	B 1
CAPITAL 54	B 4	B 4	B 4	B 4
CAPITAL 55	B 4	B 4	B 4	B 4
CAPITAL 56	B 4	B 4	B 4	B 5
CAPITAL 57	B 4	B 4	B 4	B 4
CAPITAL 58	B 4	B 4	B 4	B 4
CAPITAL 59	B 4	B 4	B 4	B 4
CAPITAL 60		B 7	B 7	B 7
CAPITAL 61		B 7	B 7	B 8
CAPITAL 62		B 8	D	D
CAPITAL 63		B 5	B 5	B 5
CAPITAL 64			B 3	B 4
CAPITAL 65			B 8	B 8

TABLE II VALUES

Values Year 1 and Year 2

Count of Year 1	Year 2										
Year 1	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	W	D	Grand Total
B 1	10		1								11
B 2		8	1								9
B 3		1	7								8
B 4				11	1				1		13
B 5					5					1	6
B 6						4	1				5
B 7							3			1	4
B 8								2		1	3
Grand Total	10	9	9	11	6	4	4	2	1	3	59

Values Year 2 and Year 3

Count of Year2	Year 3										
Year 2	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	W	D	Grand Total
B 1	9	1									10
B 2	1	8									9
B 3		1	7	1							9
B 4			2	9							11
B 5				1	5	1					7
B 6						3			1		4
B 7						1	4			1	6
B 8								2		1	3
Grand Total	10	10	9	11	5	5	4	2	1	2	59

Values Year 3 and Year 4

Count of Year3	Year 4										
Year 3	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	W	D	Grand Total
B 1	9										9
B 2		9	1								10
B 3		1	9	1							11
B 4				9	2						11
B 5					4				1		5
B 6						4	1				5
B 7							3	1			4
B 8								2		1	3
Grand Total	9	10	10	10	6	4	4	3	1	1	58

Count of Year3	Year4										
Year 3	**B 1**	**B 2**	**B 3**	**B 4**	**B 5**	**B 6**	**B 7**	**B 8**	**W**	**D**	**Grand Total**
B 1	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
B 2	0.00	90.00	10.00		0.00	0.00	0.00	0.00	0.00	0.00	100
B 3	0.00	9.09	81.82	9.09	0.00	0.00	0.00	0.00	0.00	0.00	100
B 4	0.00	0.00	0.00	81.82	18.18	0.00	0.00	0.00	0.00	0.00	100
B 5	0.00	0.00	0.00	0.00	80.00	0.00	0.00	0.00	20.00	0.00	100
B 6	0.00	0.00	0.00	0.00	0.00	80.00	20.00	0.00	0.00	0.00	100
B 7	0.00	0.00	0.00	0.00	0.00	0.00	75.00	25.00	0.00	0.00	100
B 8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.67	0.00	33.33	100
Grand Total	100.00	99.09	91.82	90.91	98.18	80.00	95.00	91.67	20.00	33.33	800.00

Count of Year1	Year2										
Year 1	**B 1**	**B 2**	**B 3**	**B 4**	**B 5**	**B 6**	**B 7**	**B 8**	**W**	**D**	**Grand Total**
B 1	90.91	0.00	9.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
B 2	0.00	88.89	11.11		0.00	0.00	0.00	0.00	0.00	0.00	100
B 3	0.00	12.50	87.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
B 4	0.00	0.00	0.00	84.62	7.69	0.00	0.00	0.00	7.69	0.00	100
B 5	0.00	0.00	0.00	0.00	83.33	0.00	0.00	0.00	0.00	16.67	100
B 6	0.00	0.00	0.00	0.00	0.00	80.00	20.00	0.00	0.00	0.00	100
B 7	0.00	0.00	0.00	0.00	0.00	0.00	75.00	0.00	0.00	25.00	100
B 8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.67	0.00	33.33	100
Grand Total	90.91	101.39	107.70	84.62	91.03	80.00	95.00	66.67	7.69	75.00	800.00

Count of Year2	Year 3										
Year 2	**B 1**	**B 2**	**B 3**	**B 4**	**B 5**	**B 6**	**B 7**	**B 8**	**W**	**D**	**Grand Total**
B 1		10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
B 2	11.11	88.89	0.00		0.00	0.00	0.00	0.00	0.00	0.00	100
B 3	0.00	11.11	77.78	11.11	0.00	0.00	0.00	0.00	0.00	0.00	100
B 4	0.00	0.00	18.18	81.82	0.00	0.00	0.00	0.00	0.00	0.00	100
B 5	0.00	0.00	0.00	14.29	71.43	14.29	0.00	0.00	0.00	0.00	100
B 6	0.00	0.00	0.00	0.00	0.00	75.00	0.00	0.00	25.00	0.00	100
B 7	0.00	0.00	0.00	0.00	0.00	16.67	66.67	0.00	0.00	16.67	100
B 8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.67	0.00	33.33	100
Grand Total	101.11	110.00	95.96	107.22	71.43	105.95	66.67	66.67	25.00	50.00	800.00

Count of Year	Year										
Year	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	W	D	Grand Total
B 1	95.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
B 2	34.01	59.63	6.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
B 3	0.00	36.36	56.90	10.10	0.00	0.00	0.00	0.00	0.00	0.00	100.00
B 4	0.00	4.17	35.23	54.55	6.06	0.00	0.00	0.00	0.00	0.00	100.00
B 5	0.00	0.00	0.00	32.97	53.04	4.76	0.00	0.00	9.23	0.00	100.00
B 6	0.00	0.00	0.00	0.00	27.78	51.67	6.67	0.00	8.33	5.56	100.00
B 7	0.00	0.00	0.00	0.00	0.00	32.22	53.89	8.33	0.00	5.56	100.00
B 8	0.00	0.00	0.00	0.00	0.00	0.00	25.00	44.44	0.00	30.56	100.00
Grand Total	67.04	69.70	62.59	66.04	56.54	61.98	53.89	75.00	15.00	38.89	566.67

OBSERVATIONS

The main findings of the project are-

- IndusInd Bank uses a robust Risk rating framework for evaluating credit risk of the borrowers. The bank uses segment specific rating models equipped with transition matrix capabilities.
- The Bank manages credit risk comprehensively; both at transaction level and portfolio level.
- Risks on various counter parties such as corporate, banks are monitored through counter-party exposure limits, governed by country risk exposure limits also in the case of international trades.
- The bank manages risk at the portfolio level too, with portfolio level prudential exposure limits to mitigate concentration risk.
- The bank has a well-diversified portfolio across various industries and segments.
- Retail and schematic exposures (which provide wider diversification benefits) account for as much as 45% of the total fund based advances
- The bank's corporate exposure is fully diversified across 85 industries, thus insulated from individual cycles.

CONCLUSION

Banks and financial institutions are lending to individual borrowers on an ongoing basis. Credit risk management is a vital link between the borrowers and the institution. Identifying, measuring, monitoring and control lead to credit risk mitigation. Correlation and volatility of credit portfolio have a direct effect on one or the other. Transition matrix for probability of default helps top to bottom approach of the ratings calculations. It includes using credit risk, Basel II standards, foundation and advanced approaches and evaluation models. This model is a better model than value at risk (VAR) and it overlooks the limitations of VAR model (Delta method, historical simulation, Monte-Carlo method). This paper raises the awareness of VAR versus transition matrix in a heteroscedastic world within the framework for Basel II, accounting issues, tax issues. In case the limitations of this transition matrix can be improvised and the value of the credit event can be maximized it is worthwhile proposition to adopt transition matrix.

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Impacts of Decision Supporting Systems on Decision Making

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ABSTRACT

The dynamic improvement in banks and other financial provider obligated BAHRAIN COMMERCIAL FACILITIES COMPANY (BCFC) to implement the concept of Business Process Reengineering (BPR). This was to provide innovative product and services and decrease the gap between BCFC and other banks or financial service provider.

This research's object is to evaluate the impact of BPR on business performance and discover how BPR will affect (cost, quality, and time cycle) of products and services provided. Data obtained from secondary and primary sources, and analysis done through simple percentage analysis and regression analysis.

This research concludes that BPR is not risk-less, and failed to be perfectly implemented to the following reasons: lack of executive leadership, and organizational resistance.

KEYWORDS

Decision Support Systems
Decision Making Process
Knowledge-based systems
Bahrain banks

PREAMBLE

In a world progressively more motivated by the three Cs (Customer, Competition and Change), companies are paying attention for new solutions for their business problems. Lately, some of the more booming companies in the world seem to have an incredible solution, Business Process Reengineering (BPR).

1.1 Overview of BPR

An information technology takes a major function in reengineering the majority of business processes. Efficiency of processes, communications, and teamwork among responsible people will significantly increased all the way through speed, information processing capacities, and the use of computers and internet technology.

1.2 Goal of BPR

These issues dictate business enterprise of Business Process Re-engineering into the large strategy for persistent competition advantage, check costs, and distinguish products and effective price management with superior force and then faultless execution.

1.3 What to reengineer

Reference to various in the BPR territory reengineering supposed to center the attention on processes and not be restricted to thinking about the organizations, a business process is a chain of stepladder intended to create a product or a service. It comprises all the activities that carry specific outcome for a given customer, processes are currently hidden and unnamed for the reason that people consider the entity divisions more frequently than the procedure and process with which all of them are concerned. So companies that are considering a process in term of department such as marketing must switch to names those processes that they do. These names should involve all the work that engaged from start to finish.

The importance of processes not just limited to include organization diagram, they must also contain what are named process maps to provide an image of how work flows all the way through the company. Process mapping presents tools and a verified line for recognizing your exist As-Is business processes and can be used to present a To-Be outline for reengineering your product and service functions. It is the vital link that your BPR team can concern to enhanced understanding and radically develop your business processes and performance. Recognizing and drawing the processes, choosing which ones required to be reengineered and in which arrange is the critical question. No company can take up the undesirable task of reengineering all the processes at once. Generally they make their selections based on three criteria:

Table-1: Selection Based on Three Criteria

• **Dysfunction: The worst functioning process.**
• **Importance: The main serious and powerful to customer satisfaction.**
• **Feasibility: The processes those are most likely to be successfully reengineered.**

1.4 Re-engineering Stages

- The Envision stage: the company reviews the existing strategy and business processes and based on that review business processes for improvement are targeted and IT opportunities are identified.
- The Initiation stage: project teams are assigned, performance goals, project planning and employee notification are set.
- The Diagnosis stage: documentation of processes and sub-processes takes place in terms of process attributes (activities, resources, communication, roles, IT and costs).
- The Redesign stage: new process design is developed by devising process design alternatives and through brainstorming and creativity techniques.
- The Reconstruction stage: management technique changes occur to ensure smooth migration to the new process responsibilities and human resource roles.
- The Evaluation stage: the new process is monitored to determine if goals are met and examine total quality programs.

1.5 Research Objective

This research will investigate the impact of BPR on business performance in the financial sector and will test the relationship between (cost, quality, and time cycle) with business performance under the BPR solutions. Interviews will be conducted with key people who experienced this process and performance will be evaluated based on speed, quality of service provided, and cutting cost by utilizing the minimum required resources.

1.6 Research Structure

First, we will have a general review on previous literatures, and elements of reengineering. After discussing that part will explain our research methodology and present our research questions, hypothesis, and the research design. Some challenges of BPR were discussed before going to analyzing the results. On the final stage, we discussed the result that obtained to come to our conclusion.

LITERATURE REVIEW

The idea of reengineering sketches its origin back to management theories built-up in the early of nineteenth century. The aim of BPR is to revamp and modify the on hand business practices or process to attain remarkable development in organizational performance. Organizational development is a nonstop process but the rapidity of adjust has improved in manifolds. In an unstable global world, organizations improve competitive advantage BPR by completely redesigning chosen processes.

Since its initiation two decade ago, BPR has become a buzz word to carry about innovative initiatives and cultural changes in the business world. Many companies deployed BPR and achieved new competitive advantages in the global marketplace. Sharma (2006) posited that business process re-engineering implies transformed processes that together form a component of a larger system aimed at enabling organization to empower themselves with contemporary technologies business solution and innovations. Organizational valuable performance has turn out to be a catchphrase in contemporary business; as consequences there are unavoidable pressures for Business Process Re-engineering.

According to Stoddard and Jarvenpea (1995) Business Process are simply a set of activities that transformed a set of inputs into a set of outputs (goods or services) for another person or process using people and equipments. Business process entails set of logically related tasks performed to achieve a defined business output or outcome. It involves a wide spectrum of activities procurement, order fulfillment, product development, customer service and sale (Sharma 2006). Thus, Business Process Re-engineering becomes an offshoot of Business Process.

BPR relies on a diverse school of ideas. It accepts as true the on going process development, re-engineering believe that existing procedure is unconnected and there is necessity to originate a new one. Such a fresh plan will allow the designers of BPR to spotlight on innovative process. Business Process Re-engineering in the genuine brains, have mixed achievements therefore, business process reengineering projects intend to transform incompetent effort process. Henceforth, organizations required to optimize outcome from this form in actual business circumstances.

Business process reengineering (BPR) does not appear to qualify as a scientific theory because among other things, it is not duplicable and it is limited in scope (Maureen et al, 2005). Recently organizational improvement is a nonstop progression however the rapidity of change had enlarged in many ways. Which means that in these spirits surrounding organizations will improve its readiness for action in its process, if it successfully design and apply Business Process Reengineering (BPR) on the chosen procedure.

According to Huang and Palvia (2001), change management and corporate culture have played significant roles in BPR and ERP acceptance in various countries. Aspects affecting BPR execution outcomes can be classified into two categories: national & environmental and organizational & internal. National & environmental factors include such variables as economy and economic growth, infrastructure, and government regulations. Organizational & internal factors describe such firm specific aspects as information technology (IT) maturity, BPR experience, and computer culture. On the one hand, information technology, such as ERP, enables and reinforces firms' innovative behavior as one of the key success factors for BPR and change management. The Conference

Board (2004) reports that "IT systems that don't mesh, making it difficult to consolidate data cross the organization" as one of the key obstacles to innovation and BPR. On the other hand, BPR is measured as one of the fundamentals for a successful ERP implementation.

In learning national differentiation and execution practices, Sheu et al. (2003) find that culture and language, government and corporate policies, management style, and government regulations are among the key aspects that have to be taken into consideration to successfully implement BPR & ERP in the global marketplace. Moreover, Martinsons (2004) reports that even in the same country using the same information technology, four private (non-state) ventures (PVs) that he studied performed significantly better than four state-owned enterprises (SOEs) in implementing ERP in China.

Thus, he considers that dissimilar types of organizations even within a single country may behave differently due to social, cultural, and government policy influences. Based on a study of 150 enterprises in China, He (2004) finds via a resource-based viewpoint that BPR is one of the critical success factors (CSFs) of ERP implementation along with executive support, ERP-SCM vision, and ERP Communications of the IIMA 25 2005 Volume 5 Issue 1 Comparative Study of BPR in China Xin James He concept. While high costs, high complexity are considered the most commonly encountered obstacles of ERP implementation both in China and in USA, insufficient IT infrastructure, lack of well-trained workers, lack of incentives for the state-owned enterprises (SOEs), and different corporate culture are China specific obstacles to ERP implementation (He, 2004).

Aremu and Saka (2006) argued that Information technology (IT) is a strategic resource that facilitates major changes in competitive behavior, marketing and customer service. In essence, IT enables a firm to achieve competitive advantages. IT should be viewed as more than an automating or mechanizing force; to fundamentally reshape the way business is done. Information technology (IT) and Business Process Reengineering (BPR) have recursive relationship. IT capabilities should support business processes and business should be in terms of the capabilities IT can provide

2.1 Elements of Reengineering in an Organization

Ezigbo (2003), the essential element or principles of reengineering include the following:

Table-2: Essential element or principles of reengineering

• Rethinking the theory of the business.
• Challenging old assumptions and discharging old rules that are no longer applicable.
• Breaking away from conventional wisdom and the constraints of organizational boundaries.
• Using information technology not to automatic outdated process but to redesign new ones.
• Externally focus on clients and the age group of superior value for clients.
• Internally spotlight on binding more of the potentials of groups and concern it to those activities that identify and deliver values to customers.
• Encourages training and development by building creative work environment.
• Consider and carry out as much activity as feasible horizontally, focusing on flows and processes through the organization.

RESEARCH METHODOLOGY

There are number of phases involved in the production of research document, however we used empirical and descriptive method to reach our objective in this research. According to Hammer & Champy (1993) 'Reengineering is the basic review and essential redesign of business processes to reach remarkable improvements in critical measures of performance such as cost, quality, service and speed'. Therefore, our dependent variable is Business performance and independent variables are (Speed, Quality, and Cost). Data for this paper was obtained from primary and secondary sources. The primary source involves the use of questionnaire that was designed considering expert views on business process re-engineering. The paper further employed personal interview to obtain additional information on the specific areas that the questionnaire mechanism did not cover. The secondary

data source is extracted from report, journals, textbooks and other relevant publications.

3.1 Research Questions and Hypotheses

We set three questions to be answered through this research as follow:

Table-3: BPR Based Hypothesis

- Do BPR enhance cost cutting in the process of delivering services or products.
- Do BPR enhance quality of services or products **provided?**
- Do BPR enhance speed and time consumed in delivering services or **products?**

The following hypotheses formulated to be tested.

Table-4: Hypothesis Formulated

H_1. There is significant relationship between cost and business performance.
H_{o1}. There is no significant relationship between cost and business performance.
H_2. There is significant relationship between quality and business performance.
H_{o2}. There is no significant relationship between quality and business performance.
H_3. There is significant relationship between time cycle and business performance.
H_{o3}. There is no significant relationship between time cycle and business performance.

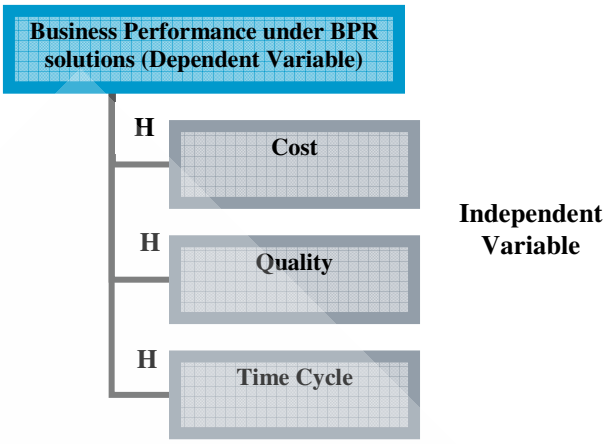

Figure 1: Research Model

3.2 Research Design

We followed a quantitative method by distributing questionnaire to staff from various strategic departments of Bahrain Commercial Facilities (BCFC) which already implemented BPR solutions and this will add some qualitative feature. The questionnaire was divided into two parts. The first section asked to the respondents about their views on the impact of business process reengineering on organizational performance while the second section focuses on the demographic characteristics of the respondents. The data collected were analyzed through simple percentage analysis and regression analysis.
We distributed 80 questionnaires to targeted people and we get back 50 responses only which represent 62.5% of our targeted sample.

CHALLENGES AND IMPLEMENTING BPR

Companies need to have sufficient motivation to make significant changes for business and performance improvements. However, generally this is difficult to reach due to the resistance of change by the organization culture and the commitment and reliance on the existing processes.

Moreover, high cost of change specifically the cost of high-end technology implementation and its obstacles may stand as barriers to the success of BPR solution, where advance technology needs a professional and well trained human resources in addition to a well stabilized infrastructure or even in many organizational development it will cost to outsource its technology based solutions to a vendor.

As BPR combine tasks and processes to fewer and may reduce human interaction, as a result human allocation, restructuring and downsizing will be a considerable concerns to the company's management and a difficult decision to take. Furthermore, luck of time and deprived planning may lead companies to fail in implementing BPR solution which this will case huge financial losses.

RESULTS AND FINDINGS

H_1. There is significant relationship between cost and business performance.

This hypothesis laid down to test the relation between (Cost & Business Performance) under BPR solutions and to answer the first question in this research (Do BPR enhance cost cutting in the process of delivering services or products). On the other hand, we set null hypothesis against H_{01}.

When the regression between cost and business performance calculated (sig=0.307, which is greater than 0.05) therefore H_1 rejected while H_{01} accepted which mean the relationship between cost and business performance doesn't exist.

Table-5: Research Based on ANOVAs Test-1

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.174	1	.174	1.067	.307[a]
	Residual	7.806	48	.163		
	Total	7.980	49			

a. Predictors: (Constant), Cost

b. Dependent Variable: BP

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.453	.513		6.725	.000
	Cost	.129	.124	.147	1.033	.307

a. Dependent Variable: BP

- **H_2. There is significant relationship between quality and business performance.**

This hypothesis laid down to test the relation between (quality & Business Performance) under BPR solutions and to answer the second question in this research (Do BPR enhance quality of services or products provided). On the other hand, we set null hypothesis against H_{02}.

When the regression between quality and business performance calculated (sig=1.582, which is greater than 0.05) therefore H_2 rejected while H_{02} accepted which mean the relationship between quality of service & products provided and business performance doesn't exist.

Table-6: Findings Based on ANOVAs Test-2

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.255	1	.255	1.582	.215[a]
	Residual	7.725	48	.161		
	Total	7.980	49			

a. Predictors: (Constant), Quality

b. Dependent Variable: BP

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.593	.313		11.477	.000
	Quality	.106	.084	.179	1.258	.215

a. Dependent Variable: BP

- **H_3.** There is significant relationship between time cycle and business performance.

This hypothesis laid down to test the relation between

(Time Cycle & Business Performance) under BPR solutions and to answer the third question in this research (Do BPR enhance speed and time consumed in delivering services or products). On the other hand, we set null hypothesis against H_{03}.

When the regression between time and business performance calculated (sig=0.004, which is less than 0.05) therefore H_3 accepted and H_{03} rejected, which mean the relationship between quality of service & products provided and business performance exist and BPR enhance the time cycle to deliver product and services.

Table-7: Research and Findings Based on ANOVAs Test-3

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.266	1	1.266	9.053	.004[a]
	Residual	6.714	48	.140		
	Total	7.980	49			

a. Predictors: (Constant), Time
b. Dependent Variable: BP

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	5.249	.425		12.346	.000
	Time	-.307	.102	-.398	-3.009	.004

a. Dependent Variable: BP

DISCUSSION

BPR solution objectives is to help the companies to fundamentally rethink how they do their work in order to dramatically cut operational cost, improve customer satisfaction by the quality of the products and services provided, and speed up the consumed time to provide the products or services. Therefore, BPR aims to enhance business performance and as (Hammer and Champy, 1993) said: "Reengineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvement in critical, contemporary measures of performance such as cost, quality, service, and speed".

In our research we distributed 50 questionnaires to Bahrain Commercial Facilities (BCFC), a company which just experienced the BPR solutions, and from BCFC's experience which is reflected on the questionnaire answers we come to the following results after calculating the linear regression between business performance as an independent and the following variables as dependants (cot, quality, and time).

- There is no relationship between cost and business performance after implementing BPR. Although it's known that an important aspect of business performance is the cycle time, and it's know as the total consumed time to accomplish a frequent task. It also may extend this definition to reach the time consumed to come with new ideas of products or services to the customers. Time can be used to measure productivity by comparing time consumed in specific company with benchmarks. Many benefits can reached by reducing time cycle such as product or services can enter and reach market earlier, and enhance profitability.

- There is no relationship between quality and business performance after implementing BPR. However we know that the use of operational techniques and activity to maintain a quality of product or service that will satisfy specific needs, the aim of quality is to provide quality that is satisfactory, e.g (safe, and economical) which require an integrating several related steps including proper specification to meet the requirements; production to meet the specification; inspection to determine the degree of conformance to specification; and review of usage to provide for revision of specification. To control quality management and especially top management must have a commitment to TQC, to enhance the quality of products and service provided; where process capabilities and design, ethics, change and development, internal staff relations all should be controlled.

- There is a positive relationship between time and business performance after implementing BPR. Many companies beset with extremely long time to deliver a product or services and cannot solve this issue because they have difficulties to bring products and services on idle time.

The causes of long cycle time are broad and diverse, and have a growing impact on operating results. However, recognizing and modifying the source obstacle should be made to attain major enhancements in business performance. The disadvantages of long time cycle can swing between customer dissatisfactions and loss of customer base, drop in sales, high cost because of non value added processes, destroying goodwill, and losing the business. Cycle time always should be pressed in all stages to achieve an idle time cycle from time that order is taken to delivering product and services. The process design must spotlight the customer's needs: high quality, short cycle time, and low cost.

In our interviews with account department we concluded that the new system causing them many errors since it's migrated with the old system, moreover other staff who use the output of account department were complaining about accuracy of work done. Therefore, we come through that account staffs were not well trained on the new system and/or not willing to accept this change.

Moreover, consumer finance department were referring any delay or errors in underwriting loans to the new system which is again show as the lack of knowledge or training to those employees.

These results are not limited to this research only; where in diffident scenarios of BPR implementation the results might be different and the relation between the dependant and the variables may vary due to several factors such as BPR implementation plan, post implementation procedures, organizational culture, management commitment, quality assurance. Etc...

CONCLUSION

BPR put forward hope of providing such improvement in cost, cycle time, quality, and use of capital to many enterprises. Reengineering is not riskless, and many have failed to reengineer. There are several victorious stories, like: Ford Motor, and IBM Credit. However, some will fail.

The reasons why reengineering efforts fail are often due to lack of executive leadership or due to organizational resistance therefore Companies need to have sufficient motivation to make significant changes for business and performance improvements. BCFC management was committed to change; it is ready for change, but information technology support was not up to the standards and the employees were not trained well on the new system and this obstacle mentioned previously in chapter four under challenges as follow high cost of change specifically the cost of high-end technology implementation and its obstacles may stand as barriers to the success of BPR solution, where advance technology needs a professional and well trained human resources in addition to a well stabilized infrastructure or even in many organizational development it will cost to outsource its technology based solutions to a vendor.

The concluded relations reflects BCFC experience in implementing their BPR solution and the inverse relation might be due to a failure of the BPR implementation in any phase of that project.

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Study of Select Issues related to Supply Chain Coordination: Using SAP-LAP Analysis Framework

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ABSTRACT

Supply chain coordination is concerned with managing dependencies between various supply chain members. It is the joint effort of all supply chain members to achieve mutually defined goals. The paper presented here is a case study of a leading automotive components manufacturer in India. The case analyzes the status of coordination in its supply chain with the help of SAP-LAP model.

A situation-actor-process (SAP)-learning-action-performance (LAP) model has been used to analyze the issues related to the coordination of supply chain for the case company. Based on SAP analysis, various learning issues have been identified which lead to suitable action followed by impact of SAP on the performance of the supply chain of the organization.

KEYWORDS

	Supply chain Management		coordination
	Flexibility		Situation analysis
	Case study		SAP-LAP

PREAMBLE

A firm needs to develop effective coordination within and beyond its boundaries in order to maximise the potential for converting competitive advantage into profitability (Dyer and Singh, 1998). Coordination is defined as managing dependencies or joint efforts of members towards common goals (Malone and Crowston, 1994).These members are dependent on each other to effectively transfer goods and information among each other. Self-interest of a member may hurt the performance of the other supply chain members and may result in degraded overall performance of the supply chain (Horvath, 2001).

In this paper, a case study of a leading automotive components manufacturer in India, ABC, has been undertaken to analyze various issues related to upstream and downstream coordination.

The organization of this paper is as follows. The main issues based on the background to the case organization are highlighted in Section 3 after literature review in section 2. In Section 4, the SAP-LAP framework is presented. Learning issues from the study have been analyzed using SAP-LAP analysis in section 5. Paper is concluded with concluding remarks in section 6.

LITERATURE REVIEW

Literature review has been reported under three subheads of supply chain coordination, flexibility and SAP-LAP model.

1. Supply chain coordination

Supply chain coordination is an effective approach to streamline operations/processes between the dependent supply chain members (Chopra and Meindl, 2003). The dependencies between the supply chain members can be managed with the help of coordination mechanisms such as supply chain contracts, information sharing, information technology, collaborative decision-making, meetings with supply chain members, and technical support (Tsay, 1999; Cachon and Fisher, 2000; Disney and Towill, 2003).

A large number of quantitative models have been reported in the literature for supply chain coordination. For example, joint ordering, replenishment and forecasting (Aviv, 2001), inventory data sharing (Moinzadeh, 2002), procurement process (Arshinder et al., 2004), multi-plant coordination (Bhatnagar et al., 1993), coordinated distribution (Lee and Kim, 2002), and initiatives like vendor managed inventory (VMI) (Disney and Towill, 2003). Also Efforts have also been made to consider important coordination mechanisms (supply chain contracts, information sharing, information technology, and joint decision-making) to quantify coordination capability of an organization (Kaur et al., 2006).

2. Flexibility

The issue of flexibility is gaining significant importance in management. Chandra and Grabis (2009) note the potential opportunities offered by flexibility of a system in enhancing its functionalities and capabilities. After defining the nature of flexibility, paper describes flexibility in a supply chain, pertinent issues, and potential tools and techniques utilized for designing and modeling flexibility in it.

Some of the future challenges and issues in designing and operating flexible supply chains are evolution of global supply chains, concurrence of product, process and supply chain design processes and valuation of flexibility enablers. Hamblin (2002) discusses the concept of flexibility as a managed performance measure through case research in the aerospace Defence industry in the UK and the USA.

3. SAP-LAP

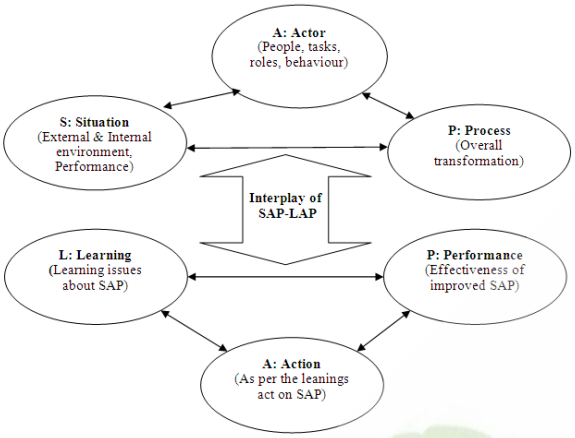
A situation-actor-process (SAP) learning-action-performance (LAP) model of a flexible system is proposed by Sushil (2000). For the systemic inquiry of coordination issues in supply chain and the adoption of coordination mechanisms by supply chain members the same framework can be used. The respective terms in SAP-LAP are explained below.

The "situation" represents the present status, environment of an organization, and the driving forces for good performance of an organization. The "actors" are the individual participants, or group of members, which influence the situation and define an organization culture to evolve business processes.

The "process" is an overall transformation process that converts a set of inputs into outputs to recreate the situation (Sushil, 2001a). The interplay and synthesis of SAP leads to LAP in which various learning issues are brought out regarding SAP. Based on the learning's, action is to be taken on the front of SAP or the interface. The impact of the action on the performance can be analyzed for the improved performance of actors or processes and situational parameters.

SAP-LAP model has been used by a number of researchers (Kak, 2004; Sushil, 2001b; Husain et al., 2002) in a variety of situations through case studies in automobile and pharmaceutical industry. These case studies have analyzed the issues regarding financial health of companies, core competencies, strategy formulations, and role of flexibility in strategy formulation.

The SAP-LAP model in these case studies is used in a very holistic manner, which helps in the understanding various issues that make an organization different from its competitors. Table-I show the applications of SAP-LAP in various industries.



Source: (Sushil, 2001)

Figure 1: SAP LAP analysis framework

Table-I Applications of SAP-LAP in various Industries

S.No.	Researchers(year)	Applied to	Issues covered
1	Sushil (2001b)	Human resources	Hard and soft system paradigm
2	Majumdar and Gupta (2001)	Automobile	Internet and e-business technology
3	Sharma (2001)	Manufacturing	Adoption and operation of Flexible manufacturing Technology in Indian context
4	Kak (2004)	Pharmaceutical	Learning issues about strategic management, core competency and flexibility
5	Agarwal (2005)	Application softwares	Issues regarding cultural and environmental factors
6	Thakkar (2008a)	Manufacturing	Information technology (IT) adoption and implementation in Supply Chain
7	Garg (2009)	Maintenance	Engineering support issues

BACKGROUND TO THE CASE ORGANIZATION

The case organization under study is a multi-product, multi-location Group having turnover of $ 650 million per year and 36 plants in India, 3 in Germany, 1 in Czech Republic, 1 in Poland, 1 in Indonesia, 1 in Vietnam, 1 in Uzbekistan, Office in Europe & Japan Number of employees over 12000 and Cater to all OEMs and vehicles manufacturers in India and also supplying to OEMs in Europe and Asia.

Vision, Growth and Expansion:

"To be a dynamic, innovative and profitable global automotive organization for emerging as the preferred supplier and employer to create value for all stakeholders" The following are driving factors for ABC to become one of the largest in the world:

Research and Development:

ABC research and development activities involve designing and development of new products, manufacturing and testing of prototype samples, reliability testing, product quality improvements, rationalization and technical coordination with other manufacturing locations in respect of quality and warranty.

Quality initiatives:

All the manufacturing facilities are ISO/TS 16949 certified. Quality improvement is the foremost activity of this organization.

Sourcing:

The preference is always to form close and long-term partnerships with the suppliers. The team of competitive and motivated technical associates establishes suppliers of world-class quality at competitive prices and optimum delivery performance.

Performance:

The most important measure of performance is the quality. This is followed by innovation to ensure and sustain business and to keep customer satisfied for a

long-term growth.

According to ABC, coordination can be achieved: by understanding the customer requirements, by delivering the order on time with right quantity, and by sharing the information with the suppliers. The effectiveness of coordination can be assessed on the basis of quality, innovation, and customer satisfaction.

SAP-LAP FRAMEWORK

A case study is presented to understand the supply chain coordination issues and flexibility required in adopting the coordination mechanisms in automotive components manufacturer in India. The interviews were conducted with the senior managers in manufacturing units of ABC on the basis of SAP-LAP model of inquiry (Figure 1). A structured set of queries was prepared, as shown in Table II, to bring out the issues related to supply chain coordination.

Table II: A template for queries about SAP of ABC with reference to supply chain coordination

SITUATION
• What is the current position of the case company in the market as compared to its competitors?
• What are the problems faced by the case company with regard to increasing its market share / sustaining its business?
• How this organization is different from the competitors and from the other players in the automotive industry?
• What are the driving forces of this organization's success?
• What are the core competencies of the organization?
• What are future plans of company?
• Are the employees aware of supply chain and supply chain coordination?
• What initiatives they have adopted to coordinate with the suppliers and buyers?
• What efforts are made for intra-organizational coordination?
• What sort of flexibility lies in adopting the coordination mechanisms?
• To what extent is the process flexible?
• What is the present level of coordination?

ACTOR
• What is the role of top management in tackling the business problems of case company?
• Whether the suppliers of case company are included in the decision making process?
• Are the customer are included in the decision making?
• Are suppliers giving training and demonstrations according to plant requirements?
• What types of data /information's are shared with suppliers?
• Are the functional departments are well coordinated by some coordination mechanisms?
• What factors inhibit effective coordination among the supply chain partners?
• How much importance is given for the long-term partnerships with suppliers and buyers?
• What behavioral factors are required to coordinate with the members of supply chain?
• Are members ready to do all operations collaboratively?
• What kind of flexibility is required to coordinate with each other?
• What are the barriers they observed while coordinating with each other?
• What are the enablers of supply chain coordination?
• What are the perceptions of coordination by supply chain members?

PROCESS
• What are the operations case companies is doing to sustain its current position in the market?
• How the processes related to sourcing are coordinated with the suppliers?
• How the employees of the case company are included in the problem solving /decision making?
• Which coordination mechanisms are undertaken to achieve coordination?
• How coordination is achieved with the buyers?
• What is the expected outcome of coordination on the performance?
• How intra-coordination is achieved?
• Is the information system able to coordinate inter-functional departments in intra-organizational system?
• What are the performance indicators for measuring coordination?
• What are the methods of transaction and communication?
• Are the designing process done in a coordinated way?
• What is the process of acceptance of quotations and suppliers selection with reference to coordination?
• How the contract design and order management improve the company performance?

APPLICATION OF SAP-LAP IN CASE STUDY OF ABC

SAP-LAP model is very effective tool to analyze the case study and to explore the present situation of coordination in ABC. This tool will also help in consolidating various perspectives and efforts required to coordinate by various actors of supply chain, and different processes, which enhances coordination, at intra-organizational and at inter-organizational level.

The SAP leads to various learning issues about the success factors, core competencies, coordination mechanisms, difficulties in achieving coordination, and flexibility required to adopt the concept of coordination. Based on these learning issues, corrective actions may be suggested to improve the supply chain coordination. The impact of these proposed actions on the performance is observed in the context of ABC.

1. Situation

The situation represents the present status of ABC in terms of market share; technology, R&D, flexibility, competitive advantage, and the performance measures. The competitiveness in the above-mentioned situational parameters help ABC coordinate with the suppliers and buyers. The executives of various plants of ABC were interviewed to gauge the following situational parameters about the status of coordination in ABC:

Situational parameters about the status of coordination in ABC:

- Functional areas of ABC are Designing, Tool Manufacturing, Manufacturing Engineering, Component Manufacturing, Assembly, Concept Design Cell, and Quality.
- Due to frequent change in product requirement and variety of product (batch size 150-200 as per order) company has good in-house R & D and manufacturing capabilities.
- Company have Fully integrated Design Cell for new Development & Reverse Engineering, Strong team of expert Designers /Engineers, High end CAD-CAM systems.
- ABC has a professional management set up, which emphasizes on continuously modernizing and upgrading the product range. ABC has developed an ever expansion strategy for the introduction of new products.

- Company Current position is first in supply to 2 wheelers, second in supply to 4 wheelers and overall position including two and four wheeler supply is first.
- The first priority of ABC is to deliver quality products and quality service. •Future plans are to become preferred Global supplies.
- Approximately 15 at unit level and total 25 members are involved in managing supply chain.
- •Company involved in mid-term (3 yrs.) and short term planning. • In ABC, the members from various functional departments are well coordinated and share information regarding their respective functional area. The shared information helps in joint planning of forecasted demand and production schedule.
- The inter-organizational coordination can be better achieved by identifying and working on the gaps in coordination with the other members of supply chain.

2. Actors

There are more than 12,000 employees working in ABC. The employees are motivated and creative. The strategic decisions in all manufacturing plants are taken jointly. ABC believes in continuous improvement and encourages the active participation of suppliers and buyers. The following views about coordination were gathered based on the field visits and structured interviews with the executives/employees of ABC:

Actors of ABC
• ABC forms long-term partnership with their suppliers and buyers. To maintain long-term partnerships, ABC regularly organizes meetings with members of supply chain.
• Meetings are considered to be very important. Because meetings give motivation to suppliers and buyers to coordinate with each other.
• The concept of coordination is visible within ABC as cross-functional teams are developed. These teams work together to select the suppliers.
• Employees from various departments jointly plan the operational activities. They use tools like fish bone diagrams for problem solving and analysis.
• The employees are committed and zealous to do work and are flexible in adopting new ideas. The team spirit is very much evident at work.
• Sales and production people meet very frequently to plan for future demands.
• Use of Technical centre facilities and adoption of new technologies have motivated the employees to be more innovative.
• There are about 300 technical experts, who are engaged in developing new products to understand the specific needs of the customers.
• The concept of intra-organizational coordination is extended to achieve coordination in inter-organization system.
• The actors of ABC from different functional units jointly take decisions regarding demand projections and production.
• ABC coordinates with buyers to take joint decisions regarding replenishments to improve the ultimate customer service and supply chain performance.
• The actors from different organizations work jointly towards mutually defined goals and serve ultimate customers.
• For a better relationship and understanding, the suppliers are invited to training sessions /demonstrations so that the design requirements are better understood and met.

3. Processes

Supply chain coordination deals in managing dependencies between supply chain members. All the members of supply chain are dependent on each other to carry out different processes like procurement, production, and distribution. While procuring the raw material the suppliers and ABC are dependent on each other for certain activities like: design and acceptance of quotations, supplier selection, contract design, order management, and order acquisition along with activities like information sharing and joint decision-making regarding operational parameters. Similarly, ABC is dependent on the buyers to know their order information, due date's data and other product-related information. To manage these external dependencies, the employees within ABC work in close relationship. The efforts put in and required by ABC at different interfaces of supply chain are explained below.

A. Coordination effort at upstream end

Case company is involved in manufacturing a large number of components with their changing specification, so it has to deal with a large number of suppliers. It can be observed that to manage such a large number of suppliers is not an easy task. However, to sustain the leading position, ABC has to continuously improve the performance.

The following activities are carried out to coordinate at upstream and downstream end.

(i) Quotations from suppliers are handled manually involving considerable paperwork.

(ii) Suppliers are selected on the basis of traditional attributes. The subjective evaluation takes place in which supplier's company structure potential, quality potential, logistics potential; technical potential and cost potential are included.

(iii) Once the suppliers are selected, they are encouraged to form a formal contract with ABC. A

contract specifies parameters (like quantity, price, time, and quality).

(iv) The modes of communication used by ABC are phone and email for managing orders from customers.

(v) The supplier takes sole responsibility of inbound logistics.

(vi) Only capacity and order information is shared between ABC and the suppliers.

(vii) The major cost reduction can be done at the design stage, but there is no initiative by both the suppliers and ABC to collaborate at this stage.

(viii) In ABC, the level of information sharing with the supplier is very high regarding capacity, production schedule, lead time, order information, product specifications, and product promotions. They share moderate information regarding inventory, end customer data, sales data, and future plans. In general, very low level of information sharing seems to be there regarding cost-related data, price schemes, product design, and research and developments.

B. Coordination effort at downstream end

The following activities are coordinated by ABC with their buyers:

(i) ABC gets some inputs about the annual demand from their buyers; the order quantity varies with the period. The production system is flexible enough to absorb the variations in order quantities.

(ii) The quantity flexibility contracts are designed jointly with the buyer. The capacity information is also shared with the buyer.

(iii) The buyer commits certain minimum order quantity. This initiative helps to improve the profits and reduces uncertainty in order quantity.

(iv) ABC follows pull system of production to provide highly customized quality products.

(v) ABC entertains even a single piece of order. ABC is very flexible in producing small orders and the buyer gives the flexibility in delivery schedule.

(vi) ABC has proposed an initiative to coordinate the buyer's complaints. All complaints are entertained at one point. From this point, the information is transferred to the concerned maintenance department. This facility has helped in improving responsiveness of ABC.

(vii) The decisions regarding forecasting and replenishment are taken collaboratively with the buyers. It helps in reducing the forecasting error and hence, results in less demand variation.

There are different functional departments within an organization. The people from different functional domains may have conflicting views. Production department is highly dependent on purchasing department to receive raw material and also dependent on sales and marketing for forecast of sales which may be used to streamline the production schedule. The knowledge of coordination and willingness to coordinate with each other may help to cut across the functional boundaries of an organization.

4. Interplay of SAP

To implement the concept of coordination, the knowledge and understanding of the present coordination situation, and processes are required by the actors. The ABC actors may demand more freedom of choice to change the present concept of coordination in a more flexible way. The ABC actors may share values, knowledge, and willingness with other actors at intra-organizational (between various business processes of ABC) and inter-organizational (amongst different members of the chain) level. These organizations have different culture and different organization structure. The actors need to be flexible to adopt the concept of coordination of different organizations and are able to understand and implement the coordination mechanisms.

The climate and culture beyond organizational boundaries of ABC force the organization to change the situation so that coordination can be achieved with suppliers and buyers. The changing dynamic situation demands changes in the processes of ABC. The processes of designing, procuring components, manufacturing and distributing, may change when actors adopt different coordination mechanisms (like information sharing, joint decision-making, meetings, information technologies, and supply chain contracts). Flexibility is required to change the mind set of actors towards common vision and goals, so that a flexible situation is created to face uncertainty in supply and demand. Accordingly supply chain processes can be reviewed and revised.

5. Learning

There are various situational parameters like good R&D facility, know-how, and innovation in developing new products using advanced technology, expertise in delivering good quality products. Learning issues about situational parameters of ABC are:

- Global standards in quality, delivery & service, Collaboration with global industry majors to provide global standards, Develop internal competencies of global standards.
- Export is presently 20% of Group turnover, and growing at 100% per annum.
- Meet global standards and customer requirement.
- Fully integrated Design Cell, Strong team of expert Designers /Engineers and In-house tool design and manufacturing. Split micron accuracy.
- In house Product Reliability Testing and Calibration Facility.
- Deep understanding and appreciation of cross cultural diversity, Open environment with strong business ethics.
- Practice of Kaizen movements, 5S and cross-functional teams ensures improved competencies and dynamism of the employees.
- Understanding & integrating end customer needs .Enhancing value for customer.
- Technology coordination with other plants. Work as cross functional team.
- Employees having flexibility in sharing knowledge and views, Ability to change according to the needs of new generation vehicle.
- Vast range of products and believe in continuous improvement as well as understanding the latest needs of customers.
- Joint efforts on value engineering and value analysis with suppliers and buyers to reduce the cost of product.

The learning's related to various processes of ABC are as follows:

- Manual handling of quotations takes more time and there are chances of more errors because of huge paperwork.
- The suppliers are selected based on the traditional attributes like cost, quality, and delivery, which are not sufficient in today's competitive scenario. For quick information transfer and to avoid ambiguity, attributes related to information technology, and coordination capability can also be incorporated.
- At present, the transactions are done online only with few suppliers. All the suppliers need to be encouraged to send the orders online. Since suppliers are located at very far places; online order management may reduce the transactions cost. They may also share other information regarding operations planning along with the orders.
- Only capacity and order information sharing are not sufficient to reduce the uncertainties in supply lead times.
- Limited training and assistance is provided to the suppliers.
- There is a need to develop more trust between the members of supply chain, so that the initiatives like VMI can be successfully implemented.
- Some flexibility should be provided to the suppliers while designing contracts.
- Members should always be motivated and encouraged to share the production information that will improve the performance of all the members as well as the performance of whole supply chain.

The main performance measures used by ABC are quality, continuous innovation, and customer satisfaction. These performance measures are expected to be improved after implementing successful coordination with the suppliers and buyers. By incorporating coordination mechanisms in supply chain processes, ABC may form strong partnership with upstream and downstream supply chain members.

The information system used within ABC is not so efficient. There are some problems associated to this system as follows:

- Mismatch in information system at supplier's end and at the buyer's end is quite common.
- There is mismatch in inventory shown by computerized system and the actual inventory present at the shop floor. This is because the production people do not continuously update the information. It affects the ordering cycle.

6. Action

Based on the situation, actors, and processes, the following improvement actions are suggested.

A. Coordination at upstream end

A better procurement system can be proposed by achieving coordination between suppliers and ABC. The procurement processes in the existing system can be improved in the following ways:

(i) A set of web-based technologies can be used to reduce the documentation cost.

(ii) Along with the traditional attributes some other attributes like type of information systems, information sharing capability, willingness to work collaboratively, etc. are to be included in supplier selection and evaluation.

(iii) At present, ABC cannot communicate well in time because of inadequate information systems at suppliers' end. Good information systems will reduce the transactional time. Some standard analytical models are available to evaluate the suppliers (for example, Analytic Hierarchy Process (Saaty, 1980), and Fuzzy logic (Ross, 1997)). Use of these models will help in making the evaluation process more objective.

(iv) The use of formal and written contracts by ABC and the supplier should encourage the supplier to provide a streamlined supply. This would result in improved profits for both supplier and ABC.

(v) The new modes of transferring data like EDI, XML are giving remarkable results. They help in reducing the data transmission errors, clerical paperwork, and inventory investment. Also it helps in increasing the flexibility of response to rapidly changing customer demands. ABC should invest more in these technologies.

(vi) Information sharing is one of the most accepted ways to achieve effective coordination Cachon and Fisher, 2000). ABC and supplier can plan their operations if they are aware of certain information in advance. Supplier can improve his customer service and reduce the lead time if he knows in advance about the production plan of manufacturer.

(vii) The supplier and ABC can collaboratively take decisions regarding design of product. Collaborative decision-making will reduce the cost of product as well as time taken for inspecting the material supplied. The suppliers should be given proper training and their involvement should be encouraged while designing and setting quality norms. It will result in long-term and reliable relationship.

(viii) Some support and assistance should be given to the suppliers to install good information systems. Compatible information systems will help in sharing quick and comprehensible information between the supply chain members.

B. Coordination at downstream end

The main problem, ABC is facing is that of sudden increase in demand. The main challenge now is how to fulfill this demand. This sudden rise in demand may be handled by: Encouraging joint forecasting decisions with buyers, sharing capacity information with customers and implementing a good forecasting tool. Following is the proposed information system for better coordination among the supply chain members.

- **A very good ERP package is required to automate various processes of ABC.**
- **The information system must have flexibility of linking with suppliers and buyers.**
- **Suppliers can coordinate with manufacturer by installing compatible information system. The manufacturer should assist suppliers in installing and providing training in information system.**
- **All transactions may be done online.**

7. Performance

The performance of ABC is measured on the basis of following three performance measures Quality, Continuous innovation, and Customer satisfaction. ABC provides quality products to their customers. The combination of quality products and highly customized products has made them different from their competitors.

- Product customization is highly dependent on the extent of communication with the customer. They understand the customer's needs very well and also serve them with quick after sales service. ABC has also started improving their information systems. An effort has been started to do all the transactions online with all suppliers and all buyers. Initially the online communication was with limited number of suppliers. This may help in reducing uncertainty in supply and demand.

- ABC has the potential and flexibility to adopt the coordination theory.

- To measure coordination and hence to improve, the supply chain performance, ABC emphasizes on: understanding customer requirements, on time/quality delivery, and sharing information with supply chain partners.

Based on the learning's and actions suggested for incorporating flexibility, ABC may coordinate with their suppliers and buyers to improve performance. The willingness to share information, provision of transfer of clear and quick information, knowledge to understand the information and information system, and zeal to work jointly by developing more trust between the organizations will result in a smooth and uninterrupted communication. These coordination mechanisms will help in placing all supply chain members under one system. More the flexibility to adopt these mechanisms, more will be the improvement in the performance of the members.

7. CONCLUSION

Supply chain coordination is an effective approach to improve the performance of the supply chain. A case study presented here is an attempt to identify the various issues regarding coordination in ABC. A systemic model is presented to capture the whole scenario of coordination to improve the performance level of supply chain by adopting appropriate coordination mechanisms.

The utility of SAP-LAP model can be appreciated from studying the present situation of coordination, which may motivate the actors who may initiate coordination and the allied processes. The framework helps in identifying different coordination issues based on the relative importance of coordination in supply chain.

The employees of ABC are well trained, motivated, and form good relationship with other members of supply chain. They conduct frequent meetings with buyers to understand their needs, give training to suppliers, and all transactions are done online. The information sharing with the members is moderate that means lead time and order information sharing is there. They have good information system within organization, but not linked with other members.

They are trying to implement various coordination enablers like VMI, QR, ERP and ECR. There is good scope in ABC to adopt coordination issues because they are flexible to adopt new generation requirements. SAP-LAP model used in the analysis is found to be very useful in understanding various issues of coordination. The different issues discussed are coordination with supplier, coordination with buyer, information sharing,

information system, coordination initiatives, and flexibility required to coordinate with members. SAP-LAP framework has helped in understanding various coordination issues related to the downstream and upstream of the supply chain of ABC.

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Wireless Sensor Networks: *Applications and Issues*

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ABSTRACT

In today's scenario, wireless sensor network is one of the most important technologies used. Wireless communications and electronics are now available in low cost, consume less power and provide multifunctional miniature devices which are beneficial for use in remote sensing applications. These factors have improved the viability of utilizing a sensor network consisting of a large number of intelligent sensors, enabling the collection, processing analysis and dissemination of valuable information gathered in a variety of environments. A sensor network is composed of a large number of sensor nodes which consist of sensing, data processing and communication capabilities.

Sensor network protocols and algorithms must possess self-organizing capabilities. One important characteristic of sensor networks is that protocols and algorithms used in it are self-organizing which means that each sensor node is independent and creates it own infrastructure according to different situations. Another unique feature of sensor networks is the cooperative effort of sensor nodes which means instead of sending the raw data to the nodes responsible for the fusion, they use their processing abilities to locally carry out simple computations and transmit only the required and partially processed data. Sensor networks are predominantly data-centric rather than address-centric. So, sensed data are directed to an area containing a cluster of sensors rather than particular sensor addresses. This cluster may contain redundant data. To reduce redundancy and increase the level of accuracy, aggregation is performed. This can be done using the aggregator node within the cluster which further reduces communication bandwidth requirements.

A network hierarchy and clustering of sensor nodes allows for network scalability, robustness, efficient resource utilization and lower power consumption. The fundamental objectives for sensor networks are reliability, accuracy, flexibility, cost effectiveness and ease of deployment.

KEYWORDS

Wireless Communication	Sensor Networks
Reliability	Data-Centric

Theme-Based Paper

PREAMBLE

Sensor network is an interdisciplinary research area that draws on contributions from signal processing, networking and protocols, databases and information management, distributed algorithms, and embedded systems and architecture. A sensor is a transducer that converts a physical phenomenon such as heat, light, sound or motion into electrical or other signals that may be further manipulated by other apparatus. A basic unit in a sensor network is a sensor node. Sensor node is equipped with an on-board sensors, processor, memory, wireless modem, and power supply. Sensor node is also abbreviated as a node. Sometimes a node with a single sensor on board is also called a senor, this creates some confusion.

SENSOR NETWORK CHALLENGES

The challenges we face in designing sensor network systems and applications include:

- **Limited hardware**

Limited amount of hardware resources is used to optimize the maximum output is one of the biggest challenges of sensor networks. Each node in sensor network has limited processing, storage, and communication capabilities, and limited energy supply and bandwidth.

- **Limited Support for networking**

Peer-to-peer network is used with mesh topology. Network is dynamic, mobile and equipped with unreliable connectivity. No routing protocols or register has been used. Therefore, node itself acts both as a router and as an application host.

- **Limited support for software development**

The tasks are typically real-time and massively distributed, involve dynamic collaboration among nodes, and must handle multiple competing events. Global properties can be specified only via local instructions. Because of the coupling between applications and system layers, the software architecture must be co-designed with the information processing architecture.

Further wireless sensor network uses a wide variety of applications and to impact these applications in real world environments, we need more efficient protocols and algorithms. Designing a new protocol or algorithm address some challenges which are need to be clearly understood. These challenges are summarized below:

- **Physical Resource Constraints**

One of the most important physical constraints is power supply. Effective lifetime of sensor network can be determined by its power supply. Hence, energy consumption is the main design issue protocol. Other constraints are limited computational power and memory size which determines the size of data stored in each sensor node. Therefore, protocols designed should be simple and light-weighted. Communication channels are also limited which are shared by all nodes within each other's transmission range as a result communication delay increases.

- **Ad-hoc Deployment**

In some applications, ad-hoc deployments of sensor nodes are required with respect to some specific area. The sensor nodes are randomly installed without prior knowledge of infrastructure and topology. In such situation, it is the responsibility of sensor nodes to identify its connectivity and distribution among nodes.

- **Fault-Tolerance**

A sensor node may fail due to some physical damage or lack of energy. It is up to the communication protocols to lodge these changes in the network.

- **Scalability**

Generally Hundreds or thousands of sensor nodes are to be deployed in most of the applications. This is the responsibility of the protocols to scale enough to communicate with such large number of sensor nodes.

- **Quality of Service**

In some real time sensor applications as soon as the data is sensed, it must be delivered in certain period of time, before it becomes obsolete. QOS is the major parameter for such applications.

- **Unattended operation**

Many sensor applications require human intervention only during the time of deployment. If further changes or reconfiguration is needed, this all be done by the nodes themselves.

- **Untethered**

Nodes are having finite source or energy and not connected to any external energy source. Thus energy must be optimally used for processing and communication. For better optimization, communication should be minimized as much as possible.

- **Security**

Security is very critical parameter in sensor networks, given some of the proposed applications. An effective compromise must be obtained, between the low bandwidth requirements of sensor network applications and security demands for secure data communication in the sensor networks (which traditionally place considerable strain on resources)Thus, unlike traditional networks, where the focus is on maximizing channel throughput with secure transmission.

SYSTEM ARCHITECTURE AND DESIGN ISSUES

The performance of a secure routing protocol is closely depended on the architectural model and design of the sensor networks, base on the application

CPU	8 bit, 4 MHz
Storage	8K Instruction Flash 512 bytes RAM 512 bytes EEPROM
Communication	916 MHz radio
Bandwidth	10 Kilobits per second
Operating System	Tiny OS
OS code space	3500 bytes
Available code space	4500 bytes

Basic configuration of a simple sensor node requirements different architectures and design goals/constraints has been considered for sensor networks. The basic configuration of a simple sensor node is described by above table; configuration depends on the requirements of the applications.

- **Security Implementation**

In the designing phase of wireless networks, secure data communication is the main concern of sensor networks, especially if to be deployed in the battle fields, a hostile area. Therefore, the protocols design must be in accordance to the data communication security protocols. Any conflict among these protocols might create challenge for the network security.

- **Energy Considerations**

One of the important parameters to be taken care of during the creation of infrastructure and designing the routes for transmission is energy. As the transmission power of a wireless radio is proportional to distance squared or may be higher order in case of obstacles, multi-hop routing consumes less power than direct communication but it will increase overhead for topology management and medium access control. Direct communication performs well if the nodes are very close to sink.

- **Data Aggregation/Fusion**

Similar or redundant data might be generated from multiple nodes. To reduce redundancy and increase the level of accuracy, data aggregation is performed by the help of functions like suppression, min, max and average. Redundant data is suppressed or eliminated using aggregator node. Data aggregation can also help to save energy as computation would be less energy consuming than communication.

- **Network Dynamics**

There are three basic components, sensor nodes, sink and user which monitor the events in a sensor network. Most of the network architectures assume that sensor nodes are stationary. Some applications require the mobility of sinks or cluster-heads (gateways). It is more challenging to route messages from or to moving nodes, because route stability becomes an important factor for optimization, in addition to energy, bandwidth etc.

Depending upon the application the sensed event can be static or dynamic.

- **Node Deployment**

The deployment of sensor nodes in topological manner depends on the application area. It can affect the performance of routing protocol.

Deployment can be deterministic or self-organized. In deterministic approach, nodes are manually placed and data is transmitted through pre-determined paths whereas in self-organizing approach, nodes are randomly placed to identify connectivity and distribution of node according to the situations, thus creating an infrastructure in ad-hoc manner.

- **Data Delivery Models**

Data is delivered using different models based on the requirement of applications. Data delivery model can be continuous, query-driven, event-driven or hybrid. In continuous data delivery model, data is delivered on periodic basis. In event-driven model, data is transmitted as the event is triggered. In query driven model, data is transmitted with respect to the query being generated. Some applications require the combination of these models for appropriate delivery of data.

- **Node Capabilities**

Depending on the sort of work a node can be dedicated to a particular special function such as relaying, sensing and aggregation since engaging the three functionalities at the same time on a node might quickly drain the energy of that node. Inclusion of heterogeneous set of sensors raises multiple technical issues making data routing more challenging.

Security Implementation Security is data communication is a main concerning parameter for providing secure communication in sensor networks, while designing wireless networks, as wireless sensor networks may be deployed in hostile areas such as battle fields .therefore, design of protocol should work with the data communication security protocols, as any conflict between these protocols might create challenge in network security.

WIRELESS SENSOR NETWORKS Vs. TRADITIONAL WIRELESS NET WORK

A Sensor network is designed to perform a set of high level information processing tasks such as detection, tracking, or classification. Measures of performance for these tasks are well defined, including detection of false alarms or misses, classification errors, and track quality. Applications of sensor networks are wide ranging and can vary significantly in application requirements, modes of deployment (e.g., ad hoc versus instrumented environment), sensing modality, or means of power Supply (e.g., battery versus wall-socket). Sample commercial and military applications include:

There are many existing protocol, techniques and concepts from traditional wireless network, such as cellular network, mobile ad-hoc network, wireless local area network and Bluetooth, are applicable and still used in wireless sensor network, but there are also many fundamental differences which lead to the need of new protocols and techniques.

Some of the most important characteristic differences are summarized below:

Protocols, techniques and concepts from traditional wireless networks (e.g. Bluetooth, Wireless local area network, cellular network, mobile ad-hoc network) are still being used in wireless sensor network. But some fundamental differences lead to the need of new protocols and techniques. Some of these differences are summarized as:

- Hundreds or thousands of nodes are used in wireless sensor network. Sensor network may need to extend the monitored area and has to increase the number of nodes. For this, sensor network needs to be highly scalable.
- As the number of nodes is too large, addresses are not assigned to the sensor nodes. Sensor nodes are data centric rather than address centric. This requires collaborative effort between nodes.
- Sensor nodes uses broadcast communication paradigm, whereas ad hoc networks uses point-to-point communications.
- Sensor nodes are much cheaper than nodes in ad hoc networks.
- Wireless sensor networks are environment-driven. In traditional wireless networks, data is generated by human whereas in sensor networks, data is generated when changes occurs in the environment. Sensor networks are used to gather information whereas mobile ad-hoc networks are used for distributed computing

.

In wireless sensor network, data collected by neighboring nodes are often quite similar. This makes it possible to develop routing and aggregation techniques that can help to reduce redundancy and to improve energy efficiency. Thus, unlike traditional networks, where the focus is on maximizing channel throughput or minimizing node deployment, the major consideration in a sensor network is to extend the system lifetime as well as the system security

APPLICATIONS OF SENSORS

- Environmental monitoring (e.g., traffic, habitat, security)
- Industrial sensing and diagnostics (e.g. appliances, factory, supply chains)
- Infrastructure protection (e.g. power grids, water distribution)
- Battlefield awareness (e.g. multi-target tracking)
- Context-aware computing (e.g. intelligent home, responsive environment)

- **Military Applications:** Sensor networks are widely used in military sensing. Wireless sensor networks can be used for military command, control, computing, communications, surveillance, intelligence, reconnaissance and targeting systems. The Distributed Sensor Networks (DSN) and the Sensor Information Technology (SenIT) from the Defense Advanced Research Project Agency (DARPA) are applied very successfully in the military sensing.

- **Environmental Monitoring:** Another application for sensor networks is to monitor the environment. It is widely applied in habitat monitoring, agriculture research, fire detection. For example, Smoke alarms are placed in many companies.

- **Medical Application:** Sensor networks are also used in medical sciences. It can be used to monitor patient's physiological data, to control the drug administration track and monitor patients and doctors inside a hospital.

- **Home Application:** Concepts like "Smart Environment: Residential Laboratory" and "Smart Kindergarten" are applied in home applications.

- **Traffic Monitoring:** The sensor node has a built-in magneto-resistive sensor that measures changes in the Earth's magnetic field caused by the presence or passage of a vehicle in the proximity of the node. A low-power radio relays the detection data to the AP at user-selectable periodic reporting intervals or on an event driven basis. By placing two nodes a few feet apart in the direction of traffic, accurate individual vehicle speeds can be measured and reported.

- **Robotics Control:** Robotics has matured as a system integration engineering field defined as "the intelligent connection of the perception to action". Programmable robot manipulators provide the "action" component. A variety of sensors and sensing techniques are available to provide the "perception".
- **Habitat Monitoring**: The intimate connection with its immediate physical environment allows each sensor to provide localized measurements and detailed information that is hard to obtain through traditional instrumentation.

SECURITY REQUIREMETNS

Data Confidentiality: Highly sensitive data is communicated in some applications of sensor network. Therefore, secure communication must be needed. A malicious node may change the data by adding some irrelevant information within the packet. This should also be taken into consideration.

Data Freshness: This constraint is required in the environments where shared-key-strategies are employed in the design. Data freshness tells that the data is up to date. It also ensures that no old messages have been repeated.

Self-Organization: In general a wireless sensor network is a ad hoc network that necessitates every sensor node to be self-governing and flexible enough to be self-systematized and self-curing according to different circumstances.

Time Synchronization: When a data packet travels between a pair of sensors, sensors may require to

compute the end to end delay of packet delivery. Group synchronization for tracking applications may also be required in case of a collaborative sensor network.

Secure Localization: the reliability of a sensor network if proportional to its ability to accurately and automatically locate each sensor in the network. Information about accurate position is a must to pinpoint the location of a fault. In this regard, three phase Secure Positioning for Sensor Networks (SPINE) algorithm is used.

Authentication: It allows a receiver to verify that the data is received from the authorized sender. For this purpose, both sender and receiver share a secret key to compute message authentication code (MAC) of all communicated data.

CONCLUSION

As the computing power is emerged everywhere, role of sensor networks becoming more important. It requires high level of security and energy efficiency which are the major parameters to enhance the quality of life. Its scope is tremendously increasing and is likely to be widely used in future. But issues like privacy of data generated may have some negative impacts also. This can cause the limited use of a significant technology for the betterment of the futuristic information era. To make best use of this powerful technology, privacy issues should be given due consideration at the product design stage itself. Combination of legal requirements and industry best practices can also be of great help

FUTURE SCOPE

Sensor networks will grow in size because of lower cost, better protocols and advantages of dense networks.

There is an increasing emphasis for future processing and communication requirements to be met by embedded devices. As devices become ever smaller, cheaper and better provisioned, the visions of smart dust, intelligent environments and ambient computing become more realistic. Wireless Sensor Networks (WSN) also bring specific research challenges – especially in terms of automated discovery, configuration and cooperation to optimize services and message routing over the network.

Proponents of this new technology see a world with deployments to improve a wide range of operations. Engineers could wirelessly monitor miles of gas and oil pipelines stretching across arid land for ruptures, damage, and tampering. Rescue workers might detect signs of life under the rubble of a collapsed building after an earthquake, thanks to a network of sensors inside the structure. Armed forces could keep an eye on a combat zone or a vast international border via a sensor network that could promptly provide alerts of any intrusion or illicit trafficking.

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Compression - An Approach for Energy Conservation in Wireless Networks

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ABSTRACT

IEEE 802.11 has become more and more popular due to its low cost and easy deployment, it does not provide quality of service (QoS) support. QoS refers to the ability of network to provide some consistent services for data transmission. Thus, a lot of research works have been carried out to enhance the QoS support in IEEE 802.11 networks. Improvement in the QoS involves Data Transfer Rate(DTR) optimization as a prime factor for reliable data transfer in energy efficient manner. The performed work explores data compression as a technique to optimize the Data Transfer rate (DTR), because reduction in the effective size of the data to be transferred on the network leads to reduce the effective file transfer time and hence preserves the network energy.

KEYWORDS

IEEE 802.11 Wireless Networks
Energy Conservation
Huffman Compression
QoS

PREAMBLE

The development of Information Communication Technology (ICT) following Moore's Law has resulted in a situation where network users are able to make use of a wealth of versatile services. But, batteries desired to operate the electronics technology has not followed this development, which has resulted in a situation where network device user's battery can only enable a few hours of active use. Therefore, we need to focus increasingly on energy efficient wireless communication to reduce energy consumption, and also to cut down greenhouse emissions. It has been observed that there is significant energy consumption, while transmitting data over wireless networks. So, data compression techniques are one of the simplest way to trade the overhead of compression for less communication energy[i][ii]. Work performed here demonstrates the usages of data compression to reduce the energy consumption in modern devices; this involves implementation of Huffman coding, a data compression algorithm and using its outcome to secure the network energy significantly.

REVIEW OF LITERATURE

In a traditional LAN we are connecting computers to the network through cables. But the wireless local area network (WLAN) is a flexible data communications system that can use either infrared or radio frequency technology to transmit and receive information over the air. Here each computer has a radio Modem and Antenna with which it can communicate with other systems. One important advantage of WLAN is the simplicity of its installation. Installing a wireless LAN system is easy and can eliminate the needs to pull cable through walls and ceilings. WLANs allow greater flexibility and portability than do traditional wired local area networks (LAN). IEEE 802.11 was implemented as the first WLAN standard. It is based on radio technology operating in the 2.4 GHz frequency and has a maximum throughput of 1 to 2 Mbps.

A wireless Local area network (WLAN) is a flexible data communication system implemented as an extension to, or as an alternative for a wired LAN. As the name suggests a wireless LAN is one that makes use of wireless transmission medium, i.e. wireless LAN transmits and receives data over air, and minimizing the need for the wired connection. Thus wireless LAN combines data connectivity with user mobility. WLANs also allow greater flexibility and portability than traditional wired LAN which requires a wire to connect a user computer to the network. The initial cost for WLAN hardware can be higher than the cost of wired LAN hardware. But the overall installation expenses and lifecycle cost can be significantly lower. With WLAN users can access shared information without looking for a place to plug in, and network managers can setup or argument networks without installing or moving wires. There are many reasons people choose to deploy a wireless LAN, Increase the productivity due to increase mobility, Lower infrastructure cost compared to wired networks, Rapid deployment schedules etc.

The IEEE 802.11 Wireless Local Area Network (WLAN) is one of the most widely deployed wireless network technologies in the world today. Although IEEE 802.11 has become more and more popular due to its low cost and easy deployment, it does not provide quality of service (QoS) support. QoS refers to the ability of network to provide some consistent services for data transmission. Improvement in the QoS involves various factors like network energy conservation, network time utilization, Data Transfer Rate (DTR) optimization etc. as the prime factors for reliable data transfer in energy efficient manner.

To improve the QoS of the WLAN network, we explored data compression as a technique to optimize the data transfer rate in wireless networks. Reduction in the effective size of the data to be transferred on the network leads to reduce the effective file transfer time and hence preserves the network energy. The performed work exhibits the conservation of energy in both transfer of file over the network, by reducing the file transfer time through the compression and decompression mechanism performed at server and client side respectively, apart from this the energy of the battery consumed at both ends of the network is also saved[i][ii].

In the performed work, Huffman coding is implemented for file compression and its outcome is used in client server environment, to study the improvement in network DTR. Huffman codes are intact the Prefix codes, which is a type of code system (typically a variable-length code)

distinguished by its possession of the "prefix property"; which states that there is no valid code word in the system that is a prefix (start) of any other valid code word in the set.

A code for a message set is a mapping from each message to a bit string. Each bit string is called codeword, which are denoted using the syntax C={(S1,W1),(S2,W2),……..(SM,WM)} Typically in computer science we deal with fixed length codes, such as the ASCII code which maps every printable character and some control characters into 7 bits. For compression, however, we would like code words that can vary in length based on the probability of the message. Such variable length codes have the potential problem that if we are sending one codeword after the other it can be hard or impossible to tell where one codeword finishes and the next starts. For example- given the code {(a,1),(b,01),(c,101),(d,011)}, the bit-sequence 1011 could either be could either be decoded as aba, ca, or ad. To avoid this ambiguity we could add a special stop symbol to the end of each codeword (e.g., a 2 in a 3-valued alphabet), or send a length before each symbol. These solutions, however, require sending extra data.

A more efficient solution is to design codes in which we can always uniquely decipher a bit sequence into its code words. We will call such uniquely decodable code ,a prefix code which is a special kind of uniquely decodable code in which no bit-string is a prefix of another one, for example {(a,1),(b,01),(c,101),(d,011)} 1 01 000 001 . All prefix codes are uniquely decodable since once we get a match, there is no longer code that can also match[iv].

Huffman codes are optimal prefix codes generated from a set of probabilities by a particular algorithm, the Huffman Coding Algorithm. The algorithm is now probably the most prevalently used component of compression algorithms, used as the back end of GZIP, JPEG and many other utilities.

Huffman coding finds the optimal way to take advantage of varying character frequencies in a particular file. On average, using Huffman coding on standard files can shrink them anywhere from 10% to 30% depending to the character distribution. (The more skewed the distribution, the better Huffman coding will do.)

The idea behind the coding is to give less frequent characters and groups of characters longer codes. Also, the coding is constructed in such a way that no two constructed codes are prefixes of each other. This property about the code is crucial with respect to easily deciphering the code.

ALGORITHM

1. **The two free nodes with the lowest weights are located.**
2. **A parent node for these two nodes is created. It is assigned a weight equal to the sum of the two child nodes.**
3. **The parent node is added to the list of free nodes, and the two child nodes are removed from the list.**
4. **One of the child nodes is designated as the path taken from the parent node when decoding a 0 bit. The other is arbitrarily set to the 1 bit.**
5. **The previous steps are repeated until only one free node is left. This free node is designated the root of the tree.**

To reconstruct the data from the compressed file, we need to decode the file data. File decoding requires the encoded file and Huffman code tree. Before, reading bits from encoded file a pointer pointing on the root of Huffman code tree is defined. Then the encoded file is read in bitwise order ; if it's 0, then the left child of the current node is traversed; if it's 1, go to the right child of the node. The process of traversal is repeated till the leaf node is reached, arrival at the leaf node decodes a character. The decoded character is written to the decoded file, repoint the pointer on the Huffman code tree root and continue reading from encoded file until you reach the file end[iii].

RESEARCH OBJECTIVES

- To implement The Huffman Code for data compression and use it in client server environment, for the analysis of the improvement in network Data Transfer Rate DTR, achieved through Compression.
- To determine the effectiveness of implemented Compression Algorithm, by evaluating the compression ratio.

RESEARCH METHODOLOGY

The implementation involves compression and decompression of data at server and client side respectively, as a tool to conserve energy of the network. The Data is compressed at the server side and transferred from the server to the client side where the received data is decompressed to regain its original format. Due to the reduction of file size it takes lesser time and hence lesser network energy, for the transfer of data over the network. Which is of prime concern when the networks are wireless, because saving the time in a wireless network, for data transfer directly impacts on the saving of energy related to the network and devices attached to the network like laptops, mobiles etc, by saving their battery consumption. The Compression and Decompression of file is performed through Huffman coding. So, the project implementation as a whole involves following :

1. File Compression & Decompression[v]
2. Client Server communication & file transfer[vi]

FILE COMPRESSION & DECOMPRESSION

The file to be transferred in client server environment, is compressed at the server side and then passed on to the client, where it is received and then decompressed to its original format. The compression and decompression are performed by implementing the through Huffman algorithm.

Huffman compression is a lossless compression algorithm that is ideal for compressing text or program files. Huffman compression belongs into a family of algorithms with a variable codeword length. That means that individual symbols (characters in a text file, for instance) are replaced by bit sequences that have a distinct length. So, symbols that occur a lot in a file are given a short sequence while others that are used seldom get a longer bit sequence[v].

The file compression and decompression involves the development of following codes :

1. bool CompressHuffman(BYTE *pSrc, int nSrcLen, BYTE *&pDes, int &nDesLen);
2. bool DecompressHuffman(BYTE *pSrc, int nSrcLen, BYTE *&pDes, int &nDesLen);

COMPRESSION

1. The compression code starts by initializing 511 of Huffman nodes by its ASCII values:

```
CHuffmanNode nodes[511];
for(int nCount = 0; nCount < 256; nCount++)
nodes[nCount].byAscii = nCount;
```

2. Then, it calculates each ASCII frequency in the input buffer:

```
for(nCount = 0; nCount < nSrcLen; nCount++)
nodes[pSrc[nCount]].nFrequency++;
```

3. Then, it sorts ASCII characters depending on frequency:

```
qsort(nodes,256,sizeof(CHuffmanNode), frequencyCompare);
```

4. Then, it constructs Huffman tree, to get each ASCII code bit that will be replaced in the output buffer:

```
int nNodeCount = GetHuffmanTree(nodes);
```

Constructing Huffman involves putting all nodes in a queue, and replacing the two lowest frequency nodes with one node that has the sum of their frequencies so that this new node will be the parent of these two nodes. And do this step till the queue just contains one node (tree root).

```
// parent node
pNode = &nodes[nParentNode++];
// pop first child
pNode->pLeft = PopNode(pNodes, nBackNode--, false);
// pop second child
```

```
pNode->pRight = PopNode(pNodes, nBackNode--, true);
// adjust parent of the two poped nodes
pNode->pLeft->pParent = pNode->pRight->pParent = pNode;
// adjust parent frequency
pNode->nFrequency = pNode->pLeft->nFrequency + pNode->pRight->nFrequency;
```

5. Then, the final step in the compression is to write each ASCII code in the output buffer:

```
int nDesIndex = 0;
// loop to write codes
for(nCount = 0; nCount < nSrcLen; nCount++)
{
*(DWORD*)(pDesPtr+(nDesIndex>>3)) = nodes[pSrc[nCount]].dwCode << (nDesIndex&7);
nDesIndex += nodes[pSrc[nCount]].nCodeLength;
 }
```

- (nDesIndex>>3): >>3 to divide by 8 to reach the right byte to start with.
- (nDesIndex&7): &7 to get the remainder of dividing by 8, to get the start bit.

At the compressed buffer, we save Huffman tree nodes with its frequencies so we can construct Huffman tree again at the time of decompression (just the ASCIIs that have a frequency).

DECOMPRESSION

The decompression involves the constructed Huffman tree, then loop in the input buffer to replace each code with its ASCII. the input buffer, in this case, is a stream of bits that contain the codes of each ASCII. To replace the code with the ASCII, we need to iterate Huffman tree with the bit stream till we find a leaf [v]. Then, we can append its ASCII at the output buffer:

```
int nDesIndex = 0;
DWORD nCode;
while(nDesIndex < nDesLen)
{
 nCode = (*(DWORD*)(pSrc+(nSrcIndex>>3)))>>(nSrcIndex&7);
      pNode = pRoot;
      while(pNode->pLeft)
          {
              pNode = (nCode&1) ? pNode->pRight : pNode->pLeft;
              nCode >>= 1;
              nSrcIndex++;
          }
     pDes[nDesIndex++] = pNode->byAscii;
}
```

- (nSrcIndex>>3): >>3 to divide by 8 to reach the right byte to start with.
- (nSrcIndex&7): &7 to get the remainder of dividing by 8, to get the start bit.

CLIENT SERVER COMMUNICATION & FILE TRANSFER

The file compressed at the server side is passed to the client side where it is decompressed; however the client server communication involves the implementation of TCP/IP protocol and simple file transfer protocol, by using MFC CSocket class. The data to be communicated between client and server is a compressed file, compressed through Huffman algorithm. The work performed, related to server and client side coding is as follows :

SERVER CODE

There are three major functions performed by this code:

1. first listen for and establish a connection with the client,
2. next send the client the length of the file,
3. finally send the file to the client in chunks.

In the first part, the code creates a CSocket object named sockSrvr and configures it to listen on a pre-

designated port (which must be known to the server, #defined 8686).

Secondly, when a connection request is received on the port, a CSocket object named sockConnection is created to handle the connection. The connection is accepted by the sockConnectionobject in the call to CSocket::Accept(), which actually hands the connection off to a new port address, leaving sockSrvr free to listen for further connection requests on the originally-designated port.

Finally, after the acceptance of connection, the server imposes simple protocol for file transfer. Before actual transfer of file data, the server sends the total length of the file (in bytes). CFile::GetLength() retrieves the file's length in bytes, and the next function, htonl(), compensates for differences in machines that store integers in big-endian versus little-endian format i.e. htonl() is used to ensure platform independence of raw socket code, and to ease porting issues form one machine to another. Since we're using CSocket, there's no chance that the code will be used on anything but a Windows/Intel platform. The code involves a loop to send the length of the file to the client. In the loop, CSocket::Send() is called repeatedly until all bytes of the file's length are sent to the client[vi].

CLIENT CODE

There are many parallels between the client-side code and that of the server, as before, there are three main parts:

1. making a connection,
2. getting the file's length,
3. getting the file's data in chunks.

In the first part, a CSocket object named sockClient is created and attempts a connection to the server on the pre-designated port(8686). The address of the server is specified by theCString object named strIP which can store either a dotted IP address or a machine name.

Once the connection is made, the second part callsCSocket::Receive() in a loop to get the length of the file, which is converted by the ntohl() function into big-endian or little-endian format as appropriate.

In the third part, a BYTE buffer of size RECV_BUFFER_SIZE is allocated from the heap, and CSocket::Receive() is called in a loop until all bytes of the file are received. Note that RECV_BUFFER_SIZE can be different from SEND_BUFFER_SIZE, although in this code, they are the same (both are #defined to 4096).

The only tricky part of this code is the determination of the number of bytes to ask for in CSocket::Receive(). It is coded to get as many bytes as possible, up to the size of the buffer, except in the last call to CSocket::Receive(), in which we want only the remaining bytes in the file. The C++ ternary operation (i.e., (condition)?(cond=TRUE):(cond=FALSE)) is used for this purpose. The code works even if CSocket::Receive() does not retrieve the number of bytes requested. For example, suppose 4096 bytes are asked(i.e.,iiGet ==4096) but CSocket::Receive() only returns 2143 bytes. Then only write the number of bytes actually received, and update the remainder in the number of bytes left to receive, based only on the number actually received, not the number asked for[v].

ANALYSIS AND INTERPRETATION

The file compression mechanism implemented here, is Huffman Code Algorithm, which leads to lossless compression. This class of compression is used to preserve the file bits, because while transferring the files over the network if there is any loss of bits then the file is damaged, thus it will be of no use at the receiver end. Further, to conserve the network energy, reliable and efficient file compression and decompression mechanism is highly desired. In the performed work, it is demonstrated and analyzed that how the compression and decompression mechanism are implemented and are contributing to conserve the network energy. Here, it is analyzed by recording and comparing the file transfer time of uncompressed file with that of the compressed file.

The results are as follows:

1. Average Compression Ratio = 0.40
2. Average Percent Compression = 60%
3. Average Percent Data Transfer Time Saved = 47%
4. Average Percent improvement in DTR =

6.5%

The observed variation in compression ratio is graphically shown in figure 1.1

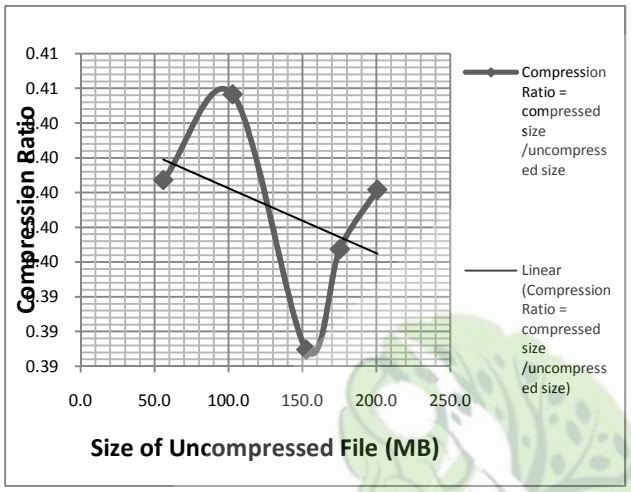

Figure 1.1: Compression Ratio Vs Size of Uncompressed File (MB)

The graph, shown in figure 1.1 above, appears to be sinusoidal, but the least square fitting of the curve, shows the linear variation in the compression ratio with the file size. However the observed variation in the compression ratio is the result of the content of the independent files, and as the implemented compression mechanism is Huffman coding which is a lossless compression mechanism by nature. Thus, some of the files which are rich in images or so, achieved lesser compression ratio. But, the files with more of the textual content and less of the images shows better compression ratio. The observed variation in compression ratio is from 0.39 to 0.41, the average compression ratio is 0.40 with a standard deviation of ~0.01. Further, the implemented compression mechanism works well and achieves 60% of average percent file compression, which is quite significant.

FINDING AND DISCUSSION

The level of file compression achieved here, has a positive impact over network energy consumption. The same is demonstrated by recording and comparing the file transfer time of the uncompressed file with that of the compressed file. It is observed that, due to compression, on an average 47% of the Data Transfer Time is saved. Further, it is observed that due to compression, average improvement in the Data Transfer Rate is 6.5% .

LIMITATION OF THE STUDY

The performed study has only evaluated the implementation of one compression algorithm i.e. Huffman coding, for evaluating the effect of compression over network energy conservation. The improvement in network DTR can be evaluated by considering various other compression algorithms.

CONCLUSION

Through the Performed work it is observed that compression of data, while transferring it over the network saves the network energy by reducing the file transfer time. If the compression and decompression codes are used at transmitter and receiver end (or Client and Server end) respectively, then the combination can be quite useful and energy conserving, in the sense, instead of sending a big file from server to client (or one node to other), which in fact will consume more network data transfer time. It will be beneficial to compress the file at the transmission end and then pass it over the network, and the receiver will decompress it in to its original format, hence less of the network transmission time will be consumed which in turn will save the energy of all the devices connected to the network.

The performed work is specifically useful for the wireless networks, because the wireless network devices are generally battery operated, and if these devices seek more time in sending and receiving the files from the network, the more the battery or energy is consumed. Thus file compression with suitably good compression ratio and decompression mechanism, will definitely saves energy of wireless network.

The interpretation of the results , leads to the conclusion that, “The higher the compression ratio is, the lesser is the file transfer time, hence lesser is the energy consumption of the network”

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Automation in Textile knitting Process: An ERP Initiative

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ABSTRACT

The production of top quality materials / products at high speed with less time is only possible through and efficient information systems. Technologies that carries the flow of work has been widely applied in the various industries, such as OA (Office Automation), manufacturing, banking, security, education and research institutions, financial services, telecommucation industy and so on. The basic objective to adopt such technologies is to improve the business processes through automation using information system. In this research work the authors would like to presents the flow of information in an automated manner for knitting of yarn in textile industry, where it is implemented in Masood textile. This automation in information system developed efficiently in-house ERP (Enterprise Information System).; it not only helps nut also support the management to manage the business processes

KEYWORDS

	Automation		Business processes integration
	Enterprise information system		Knitting
	Automated information management system		Information system

PREAMBLE

Why is Automation very important? During development and manufacturing quick information turn around, that is required to hit the target and also to sustain the speed of process. Process automation has become very much common in industry [1, 2]. Every company that is involved especially the production oriented business use the automation information system for better management and to track the business processes / operational activities [10]. Nowadays automated information system based applications are very much capable in collecting and measuring the required details for manufacturing or manufacturing related processes because process could be complex and the information required is huge [11].

The systems are based on automation is very simple thought which the information is forward to accomplish the business functions. These systems work on pre-defined procedure and required less humans interaction and maintenance as compare to traditional information system. These AI based applications fetch the information and send it for further operations. The automated system works for government, private and especially in business context e.g. customer satisfaction, sales department and operational tracking. [13, 14]

Automation in business functions provides enterprise integration by passing the information amongst the systems and processes [3]. The integration in business functions enables the systems for both data and flow of work; because to integrate the flow of work operational and functions integration is required. The reason is that information is swap between the applications, systems at different locations in ERP.

The production of top quality materials / products at high speed with less time is only possible through information systems. The ERP system in MTM (Masood Textile Mills) is consists of different applications as per their requirement for manufacturing, tracking and also to manage the resources. Each application has a distinct task and can be adapted separately to specific processes and requirements. An overlook of the system architecture for knitting is shown in figure 2. The objective of this research work is to define the processes for knitting and role of information system to make them fast, automated and efficient for tracking and monitoring during production.

AUTOMATION

Computer and related technologies are very much efficient and capable of carry out the functions that acquire humans efforts. While the execution of such function through machine or automation is just because, the humans do not wish to perfrom the same function again and again and also can not perform them consistently, accurately and reliably. Mass production is the major cause for the development of such automated system because the humans can not perform the jobs fastly as machine or automated system can [4, 5].

The automation also offer the economicle benefits at enterprise level is the major cause of attentions towards, the capabilities of automation system [6, 7, 8]. Atutomation is simply defined as atomatic control of manufacturing throught number of successive stages or the use of automative control to replace or reduce the humans efforts[4].

Process automation is described using the dedicated molding and appropriate drawing tools for work flow. While in transformation, set of rules are defined for the movement of information in the system. Where the data is read and receive from the sources agent and proceed for further operation in an understand format and this level of movement is responsible between the different connected components. The benefits of Business process automation include the work flow, data integration, and reduction of hand written form, human errors and better process flow and also to allow the new services to the customers for real time monitoring in business processes. [9]

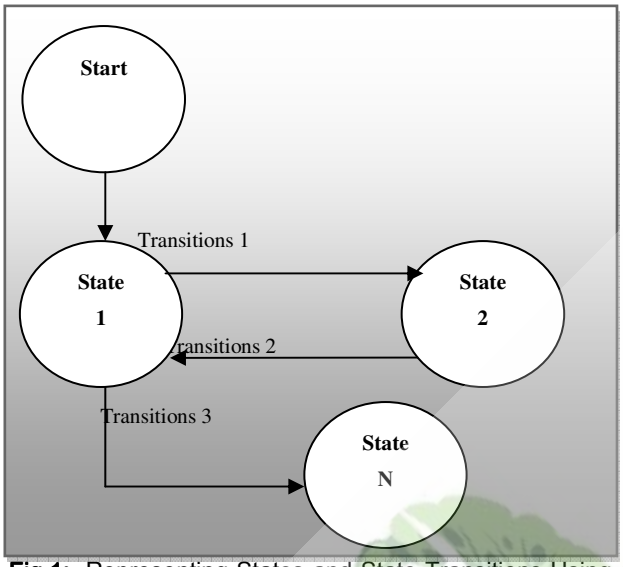

Fig.1: Representing States and State Transitions Using a State Diagram in an automated system

AUTOMATED INFORMATION IMPLICATION IN TEXTILE INDUSTRY

Information management systems are broad level systems, these systems incorporates huge amounts of data across an organization. Data is entered into systems thought-out the organization. Where it is the responsibility of data management system is to pull these data elements into unified systems. Organizations collect the massive data depends on the nature and size of the organization, and system consist on different software applications with single platform. In order to access and to utilize the information, they need a well-planned and mature information management system.

The given model for automation in information system shown in **Figure2** is practically implemented in Masood textile mills. It shows the flow of working and information during knitting process to fabric. As knitting process consists of different processes, different departments play their contribution during manufacturing process. The automated information system divides these processes in different states. Each state has number of transaction. That starts from purchase order originate by the customers and the role of each department till the job completion or final state. Each state is directly or indirectly communicates with the other to describe the flow of process along with information.

MTM (Masood textile mills) have their complete and fully developed ERP system. It almost contain all important applications that provide the vie solutions for textile operation and management. Where the knitting processes is totally based on automation. The AIS (Automated information system) includes different agent's works together in knitting e.g., customer, PPC (production and planning department), Head office, vendors, store, knitting department, third parties manufacturing units.

In (state1) customer originate the PO (purchase order) and system forward it to PPC department (production & planning control department) to check the availability of vacant slot for execution or availability of resources, if not then PO return back to customer with PO status either successful or not.

If resources are available the PO (purchase order) forward towards head office for YD (Yarn Demand). Head office in (state2) generates the inquiries to yarn vendors for YO (Yarn order) and also give the feedback or status of Yarn to the PPC department. Yarn store (state3) receives the yarn as per requirement from vendor or Yarn supplier.

If yarn (State4) does not meet the requirement the store department rejects the order and update the status back to head office. Accepted yarn issues to the knitting department knitting for fabrication. In case (state5) if knitting department reject transaction due to excessive load. The store issues the yarn to third knitting parties or for fabrication.

After the (State6) completion of order job or fabrication the knitting department or third party knitting vendor / manufacturer issue the knitted fabric to the Grey Fabric store for delivery.

In case of any discrepancy related to job order or problem in production the system back to the knitting department or to the third party. Finally the product delivers to the customer and closed the job successfully.

During the manufacturing and execution, an intelligent system clearly defines the steps for production and also provides the support in an efficient manner which is not possible traditionally. In order to access and to utilize the information, they

need a well-planned and mature information management system. The role of information system toward automation and order tracking and monitoring support the organizations for batter management and also to serve their customer efficiently.

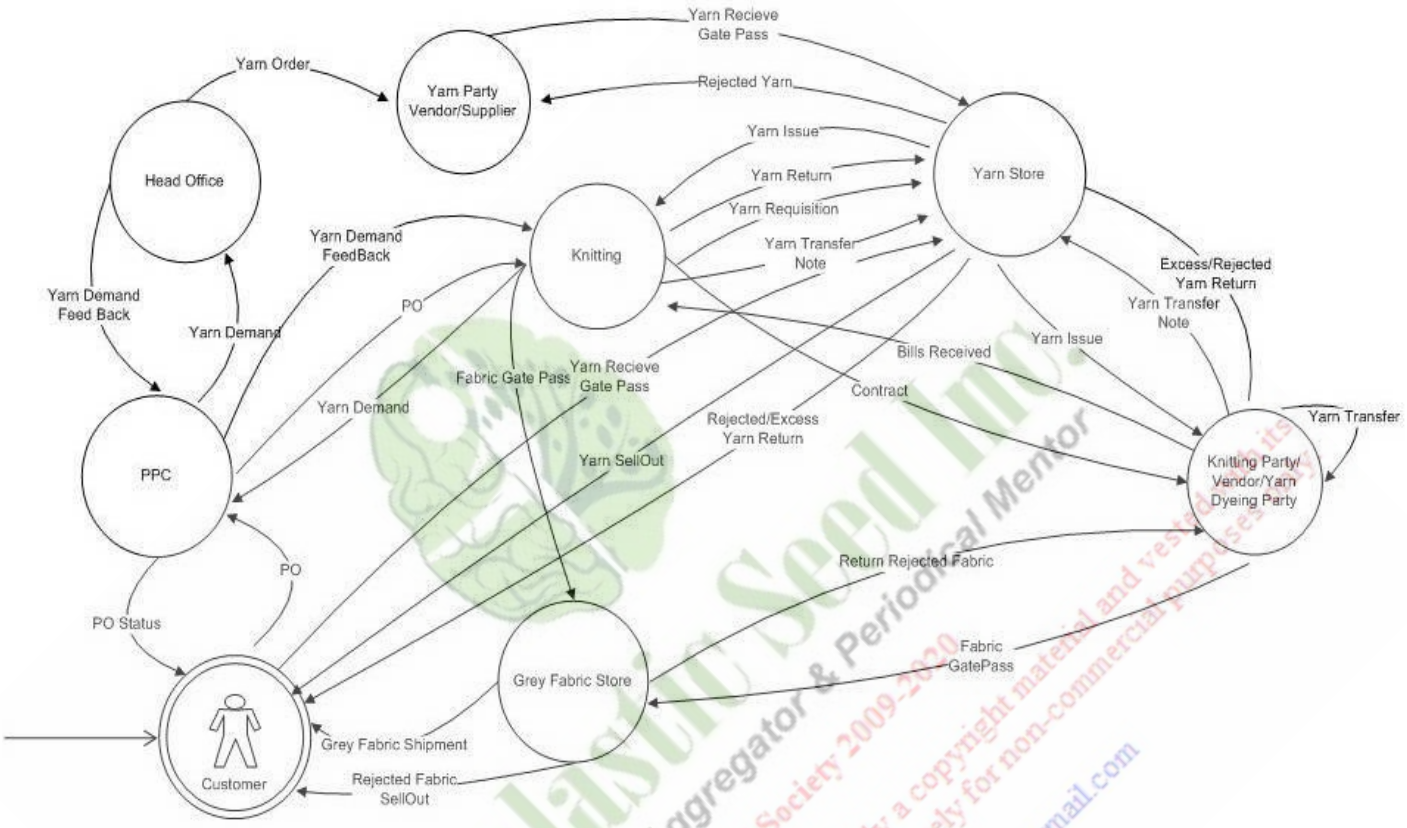

Fig.2: Automation in knitting & flow of information

CONCLUSION

During manufacturing and execution for manufacturing, intelligent system clearly defines the steps for production, planning and also provides the support in efficient manners, which is not possible traditionally. In order to access and to utilize the information, they need a well-planned and mature information system. Where it serve for automation and monitoring and tracking that support the organizations towards the better management and also to serve their customer efficiently and timely?

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He was an associated editor Taylor&Francis EIS journal from 2007 to 2010, taking part of the efforts for creation and ranking of the journal among the 12 more important in the IS arena in 2009. He also takes part of two other editorial boards of Brazilian journals in the area of Production Engineering

As an active member of the international free/open source community he was one of the signatories of the Total Information Outsourcing Manifesto, launched in Paris during the Open World Forum in 2008, which seeks to provide the basis for the construction of Service Level Agreements which guarantees the freedom of choice as well as the data privacy of Cloud Computing users. During this event he also collaborate to build the 2020 FLOSS Roadmap 2008. He also is one of the coordinators of the ERP5Br community, a free/open source ERP, at the Public Software Brazilian Portal, as well as the coordinator of the Agile Software Quality area of the same portal.

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To relax, when his working schedule allows, Rogerio practices swimming, running, and practical shooting.

Volume-3 Issue-II

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Blockchain Federation of India [BFI]

Blockchain Federation of India is the primary and principal body of blockchain professionals in India. It was founded on 13th March 2019 by a few academician and Cyber professionals including its co-founders Col. Inderjit Singh Barara and Dr. Subodh Kesharwani which has now grown to be the national body representing blockchain professionals on a PAN India basis, in fact informally through social networking cites group exists from 2017 onwards. BFI is a non-profit professional meet to exchange views and information learns and share ideas. The wide spectrum of members is committed to the advancement of theory and practice of Blockchain and Technology Systems, Science and Engineering, Information Processing and related Arts and Sciences. The Federation also encourages and assists professionals to preserve truthfulness and aptitude of the profession and fosters a sagacity of partnership amongst members. Besides formulating the activities held at the chapters and student branches, the society will also conducts periodic conferences, seminars. The society will be in touch with various International bodies of blockchain for an international alliance.

BYLAWS OF BLOCKCHAIN FEDERATION OF INDIA

Blockchain Federation of India known for its acronym (BFI) is an Indian customized international organisation dedicated to raising digital competence standards in the workforce, education and society in blockchain perspectives. BFI have a certain vision and mission:

- To bring all block chain researcher and technocrats under one roof
- Formulation of Block chain Virtual university
- Developed Own Teaching Contents in Block chain

BLOCKCHAIN VIRTUAL UNIVERSITY

Blockchain Federation of India is an international organisation dedicated to raising digital competence standards in the workforce, education and society vis-à-vis blockchain. Our proposed certification programmes, delivered through an active network in multiple countries, enable individuals and organisations to assess, build and certify their competence in the use of blockchain tools to the globally recognized BFI standard, known as BFI worldwide. As a nonprofit social enterprise Blockchain Federation of India (BFI) benefits from the exclusive support of experts from national technical societies and partners international to enlarge vendor-independent standards which define the skills and knowledge required to use blockchain technology in actual fact. We work with education and training partners, local and regional authorities, national governments, international development organisations as well as public and private sector employers in all sectors, in the delivery of our programmes. The quality and reputation of BFI is built on years of expertise earned by it's founders and associated office bearers. Our accomplishment is maintained by our forthcoming innovation in certification programme development, our commitment to rigorous test design methodologies, and consistent adherence to our quality assurance standards. Blockchain Federation of India planning to support the initiatives of National Operators of the programme in various parts of world. All Blockchain Federation of India operations work closely with regional, national and local partners to develop the global network of BFI Accredited Test Centers.

BYLAWS OF THE BLOCKCHAIN FEDERATION OF INDIA

ARTICLE I. NAME

- The name of the Federation shall be the "Blockchain Federation of India", and it shall be incorporated as a nonprofit corporation in Republic of India with a Headquarter in New Delhi.

ARTICLE II. PURPOSE

- The purpose of the Federation shall be to promote Blockchain education through faculty development and to encourage that the teaching and learning \ related to blockchain implementation in various upcoming field.

ARTICLE III. RESTRICTIONS ON ACTIVITIES

- Section 1. No part of the earnings of the Federation shall inure to its members, officers, or other private persons, except that the Federation shall be authorized and empowered to pay reasonable compensation for services rendered in direct support of its purpose.
- Section 2. No part of the activities of the Federation shall be directed towards influencing legislation or intervening in political campaigns.

ARTICLE IV. MEMBERSHIP

- Section 1. The Board may establish and/or change the membership classes. The Board of Directors shall set the dues amount and the criteria for each class of membership.
- Section 2. All individuals who are members in good standing shall have the right to vote, hold office, and serve on committees. To be in good standing, a member must not be more than six months in arrears in his/her dues and financial obligations to the Federation. Individuals more than six months in arrears in their dues will be declared inactive, but retained on the membership rolls for an additional six months. Inactive members can reinstate their good standing by payment of current and all past dues.
- Section 3. Individuals whose dues are more than one year in arrears shall be dropped from the membership rolls.

ARTICLE V. OFFICERS

- Section 1. The Officers of the Federation shall be the President, President-Elect, Secretary, Treasurer, and the Immediate Past-President. The election procedure is as described in Article VII.
- Section 2. President & Secretary. The President and Secretary of BFI is the highest ranking officer of the Federation and are directly accountable to the membership and the Board. The President leads the Board of Directors as a chairperson and Secretary will be the Convener in development of the strategic goals and objectives of the organization and provides direction and leadership. The President serves as the Chair of the Board of Directors, Executive Committee and Annual General Meetings. A detailed position description, approved by the Board, shall be maintained on the Federation's website.
- Section 3. Immediate Past-President. In those years when a new President is elected, the current President assumes the office of Immediate Past-President. The Immediate Past-President remains in office until a new Immediate Past-President assumes the office. A vacancy in the office of Immediate Past-President cannot be filled by appointment. A detailed position description, approved by the Board, shall be maintained on the Federation's website.
- Section 4. President-Elect. The President-Elect is the third highest ranking officer of the Federation and shall support the President and secretary to advance the work of the Federation. At the end of the term, the President-Elect shall assume the office as President of the Federation. In the event that the President is temporarily unable to fulfill her/his duties to the Federation, the President-Elect may be appointed Acting President by the Board of Directors. If the President resigns or is unable to fulfill their duties for an extended period, the President-Elect shall become the President and a new President-Elect shall be elected by a majority vote in a special election of the Board of Directs within 30 days. A detailed position description, approved by the Board, shall be maintained on the Federation's website.
- Section 5. Secretary: The Secretary oversees the recording of proceedings of meetings of the Federation and the Board of Directors, and is responsible for the Federation's correspondence. A detailed position description, approved by the Board, shall be maintained on the Federation's website.
- Section 6. Treasurer: The Treasurer oversees the financial records of the Federation according to standard accounting practices, and, whether performed personally or through the Federation's administrative office, is responsible for safeguarding the Federation's funds. The Treasurer presents periodic reports on the financial status of the Federation to the Board of Directors and a full report to the membership at the Annual Federation Meeting. A detailed position description, approved by the Board, shall be maintained on the Federation's website.

ARTICLE VI. BOARD OF DIRECTORS

- Section 1. The Board of Directors shall be the principal governing body of the Federation. The Board of Directors shall consist of eleven (11) Directors plus four (4) Officers plus the Immediate Past-President,

if the Immediate Past-President is not an elected Director. When the Immediate Past-President is not an elected Director, the Immediate Past-President would be an ex-officio member of the Board of Directors and the Executive Committee until a new Immediate past President assumes the office. In that capacity, the Immediate Past-President has a vote only to prevent a tie (so when an even number of Directors and/or Officers is present).

- Section 2. Directors shall be elected for a three (3) year term. The terms shall be staggered and at least three (3) seats will be elected annually. Directors may not be elected to serve consecutive terms but may be reelected after an absence of one year. The election procedure for Directors is described in Article VII.
- Section 3. The Board shall meet quarterly, or more often if the need arises, at the call of the President or at least three members of the Board. Board meetings may be held in person, by teleconference, or other electronic means. A proposed agenda and supporting materials shall be made available to Board members prior to a Board meeting.
- Section 4. A quorum shall consist of one more than half the current number of Board members and must include at least two members of the Executive Committee.
- Section 5. In the event a vacancy occurs on the Board in a Director position, the President shall, with the approval of the Board, appoint a member to fill the vacancy. These appointed members shall serve out the term of the individuals they replace on the Board. The new Director shall complete the term of the former Director and shall be eligible for reelection if the remaining term is less than two years. Individuals joining the Board of Directors by appointment as a Director shall not serve more than three consecutive years in that office as a Director in addition to the partial term they served as replacement. In the event a vacancy occurs in an Officer position, the Board will immediately elect a new officer to that position in accordance with Article VII. The elected member takes office immediately, shall serve out the term of the individual she or he replaces as an Officer and will still be eligible for one complete term (of two years) in that same Officer position in addition to the partial term she or he served as a replacement.
- Section 6. With the approval of the Executive Committee, the President may recommend that any Board member be removed from office by the following procedure: 1) reasons for the proposed action must be provided in writing to the member, 2) the member shall have 60 days in which to represent themselves at a meeting of the Board, 3) a two-thirds vote of the current number of Board members shall then decide.

ARTICLE VII. NOMINATIONS AND ELECTIONS

- Section 1. Nominations. The Nominating Committee shall on or before January 25th submit to the Federation Manager a list of candidates for each position subject to election in that year. The names of these individuals, and other such supportive materials as deemed appropriate by the Nominating Committee, shall be posted to the Federation's website on or before February 1. The Federation's administrative office shall mail or fax a copy of these materials to those BFI members who have previously indicated they do not have Internet access. Between February 1 and February 15, members may petition for additional candidates to be added to the ballot. Such nomination petitions may consist of either a single document or separate letters. To be nominated by petition, each candidate must have the support of at least 15 BFI members in good standing. All petitions and letters must be addressed to and received by the Federation Manager on or before midnight (IST) of February 15.
- Section 2. Elections. On March 1, a secured, electronic ballot shall be activated on the Federation's website, along with instructions for electronic voting. All ballots must be electronically submitted to the website on or before midnight (IST) March 15 to be counted. Results shall be posted to the Federation's website by April 1. A plurality of the votes cast is needed for election. In the event of a tie, the election shall be decided prior to April 1 by a majority vote of the current number of Board members.
- Section 3. Newly elected Directors will assume their office at the conclusion of the Federation's annual meeting.
- Section 4. The Officers (of the Federation President, President-Elect, Secretary and Treasurer) shall be elected by a majority vote of the Board of Directors by electronic vote before December 15th, and assume their duties on January 1st. If the elected Officer is a current Director, the newly elected Officer must resign as a Director before assuming the role as an Officer. Officers serve a two-year term of office, and may not serve consecutive terms. However, they may be reelected to the same office after an absence of one year. An Officer may be elected to a different position on the Executive Committee immediately following his/her current term. There is no limit on the number of times an individual may serve as an Officer. The President-Elect, Treasure, and Secretary shall be elected by the Board of Directors as described in Section 5 below. Officers may be removed by a two-thirds vote of the entire membership of the Board of Directors.
- Section 5. Nominations for Officers. In the year the Officers are to be elected, a special Officer Nominating Committee will be formed, composed of the Immediate Past-President, President-Elect, two members from the BFI Nominating Committee (elected by the Nomination Committee) and one current Director

(elected by the Board of Directors). No committee member can be a concurrent candidate for an Officer position. The special Officer Nominating Committee shall on or before November 1st submit to the Federation Manager a list of candidates for each Officer position. Candidates must be BFI members in good standing. The names of these individuals, and other such supportive materials as deemed appropriate by the Nominating Committee, shall be posted to the password protected Board website on or before November 7th.

- Section 6. If a conflict arises concerning elections of Directors or Officers, the current Chair of the BFI Nominating Committee and 2 recent Past Presidents will be appointed to resolve any conflicts.

ARTICLE VIII. STANDING COMMITTEES

- Section 1. Membership and Term of Service. Standing Committees are defined in these Bylaws of BFI and can only be removed or redefined by majority vote of the membership. Other committees may be created by the Board to serve specific duties important to the organization
    - Chairs of Standing Committees, except the Executive Committee, are nominated by the President and approved by the Board. They serve three-year terms until the close of the next Annual Business Meeting and may be reappointed.
    - Members of Standing Committees, except the Executive Committee, the Professional Development Committee and the Nominating Committee, are appointed by the committee Chair, who will notify the Board of all committee membership changes. All appointed members shall serve one-year terms until the close of the next Annual Business Meeting and may be reappointed.
- Section 2. Executive Committee. The Executive Committee, which consists of the Officers, shall make decisions and take actions on behalf of the Board in between Board meetings. The President shall call meetings of the Executive Committee.
- Section 3. Nominating Committee. The Nominating Committee shall be responsible for determining a suitable group of candidates for election to the Board of Directors. It shall consist of five members who are neither current members of the Board nor current Committee Chairs. They may not be current candidates for the BFI Board. The President shall appoint a Chair plus two members with the approval of the Board of Directors. Two members shall be nominated and elected by the membership at the Annual General Meeting.
- Section 4. Professional Development Committee. The Professional Development Committee shall be responsible for recommending the overall scientific and educational programs of the Federation to the Board. Membership will include the current BFI President, President-Elect and Chairs of the Publications Committee and of other Committees with missions relevant to professional development activities, as determined by the Board.
- Section 5. Publications Committee. The Publications Committee shall be responsible for oversight and management of all publications of the Federation. They will work in concert with the Editorial Board of the Federation's journal.
- Section 6. Membership Committee. The Membership Committee shall be responsible for evaluating the needs of the membership and recommending appropriate ways to meet those needs. The committee will develop methods and programs for active membership recruitment and retention.
- Section 7. Finance and Organizational Development Committee. The Finance and Organizational Development Committee shall assist the Treasurer, who shall serve as Committee Chair, in maintaining the financial health of the Federation, including preparation of the annual budget. It will also be responsible for pursuing appropriate federal, foundation, corporate, and private funding to support the work of the Federation. The Committee shall be chaired by the Treasurer.

ARTICLE IX. MEMBERSHIP MEETINGS

- Section 1. Annual General Meeting Time, Place, and Purpose. The Annual General Meeting of the Federation shall be held at such time and place as may be selected by the Board of Directors and stated in the Notice of Meeting. The Annual General Meeting shall include the transaction of such other business as may properly be brought before the membership.
- Section 2. Notice of Meetings. The Federation Manager shall give notice of all Federation meetings stating the place, day, and hour of the meeting and, in case of a Special Meeting, the purpose for which the meeting is called. Such notice of special meetings shall be not less than ten or more than fifty days before the date of the meeting. Notice of the Annual General Meeting is to be given no later than the prior Annual General Meeting.
- Section 3. Quorum. A quorum for transaction of business shall be not less than 10% of the total membership in good standing.
- Section 4. Voting and Representation. Each member who is present shall be entitled to one vote at all BFI meetings. A membership roll showing the list of members as of the record date, certified by BFI's Secretary, shall be produced at any meeting of the members upon request. All persons appearing on such membership roll shall be entitled to vote.

ARTICLE X. AMENDMENTS

- Section 1. Amendments of the bylaws may be proposed by a majority of the Board of Directors or by a petition, sent to the Secretary, bearing the signatures of at least 15 members in good standing.
- Section 2. Notice of proposed amendments, shall be posted to the Federation's website on or before March 1. The Federation's administrative office shall mail or fax a copy of these materials and the slate of nominees, described in Article VII, Section 1, to those BFI members who have previously indicated they do not have Internet access. On April 1, a secured, electronic ballot shall be activated on the Federation's website, along with instructions for electronic voting. The Federation's administrative office will mail or fax a ballot containing the proposed changes and the slate of candidates, described in Article VII, Section 2, to those BFI members who have previously indicated they do not have Internet access. All ballots must be electronically submitted to the website or received in the post by the Secretary on or before midnight (IST) of April 30 to be counted. The Secretary shall tally the votes and send the results to the Federation Manager for posting on the Federation's website by May 15.
- Section 3. In the event of an urgent requirement for an amendment, the Board of Directors, by a two-thirds vote, may authorize posting a proposed amendment to the members at any time. Notice of proposed amendments shall be posted on the Federation website for a 30-day period prior to balloting. At the end of the posting period, a secured electronic ballot shall be activated on the Federation's website, along with instructions for electronic voting. The Federation's administrative office shall mail or fax appropriate information and a ballot to those BFI members who have previously indicated they do not have Internet access. All ballots must be electronically submitted to the website or received in the post by the Secretary within 30 days of the opening of balloting. The Secretary shall tally the votes and send the results to the Federation Manager for posting on the Federation's website.
- Section 4. All amendments of the bylaws require an affirmative vote of two-thirds of the members in good standing who submit valid ballots.

ARTICLE XI. INDEMNIFICATION

The Federation shall defend and indemnify any qualified person against any threatened, pending, or completed legal action resulting from actions taken in good faith on behalf of the Federation. Qualified persons shall be present and former officers, employees, and officially elected or appointed members of boards, councils, committees, and other components of the Federation.

Indemnification will not be provided to any person who shall be adjudged in a legal action to be liable for negligence or willful misconduct in the performance of duty, or when such person did not reasonably believe that the action was within the law and in the best interests of the Federation.

Indemnification shall cover cost of defense and any judgments, fines, and amounts paid in settlement actually and reasonably incurred by a qualified person, up to a limit of one-million dollars in any single case except in circumstances expressly prohibiting such limitation under the law. Such indemnification shall be in accordance with the established policy of the Federation.

ARTICLE XII. OTHER PROVISIONS

- Section 1. The fiscal year of the Federation shall be on a calendar year basis (1st April to 31st March).
- Section 2. The Federation shall be governed Income tax rules of Order, as currently revised. In case of a conflict between Rules of Order and these bylaws, the bylaws shall take precedence.

ARTICLE XIII. DISSOLUTION OF THE FEDERATION

In the event of the dissolution of the Federation, the Board shall give all its assets to one or more nonprofit, tax-exempt organizations. If the Board cannot decide, the decision shall be made by the applicable Court in the Union territory of Delhi, India

ARTICLE XIII: MODE OF OPERATION & SIGNING AUTHORITY

Founder President and Secretary will be the whole time signing authority and operates banking transaction physically & virtually jointly

Col. Inderjit Singh Barara
President

Dr. Subodh Kesharwani
Secretary

Scholastic Seed Inc.
e-Publishing Aggregator & Periodical Mentor

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Membership years run 1st January to 31st December of every year						

Please check appropriate registration fee for BFI:

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10 Incredible Years of GJEIS 2009-2019

To,

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Dear Mam/Sir,

2019 is really a benchmark for the GJEIS Journal as it had completed the ten year service of serving the researcher and facilitates learning by and large in totality. GJEIS published four times annually (January, April, July, and October). Accordingly, 40 issues have been published in the first 10 years. GJEIS is a methodological journal that focuses on articles about mixed methods research across the Enterprise, Information & System. GJEIS is also an international and multidisciplinary journal that publishes manuscripts in two various categories: methodological/ theoretical papers and original empirical studies. Although there are other methodological journals that publish mixed methods studies, GJEIS focuses exclusively on mixed methods research and solicitants different types of article in GJEIS Journal which mainly focuses on research issues in the EIS and IT related areas.

1.	Empirical Research Papers (ERP) report on completed EIS research that complies with rigorous scientific standards. ERP present original results of completed research studies with the aim of obtaining feedback from fellow researchers. [Limit 16 Pages]
2.	Theme Based Papers (TBP) are short papers that present the design and preliminary results of ongoing EIS research studies with an endeavor of obtaining early feedback and further guidance from experts and peers. TBP will be evaluated using the same academic standards as regular research papers (except for completeness requirements). [Limit 12 Pages]
3.	Case Study Based Papers (CSBP) describes real-life experiences with EIS that authors wish to share with fellow practitioners and EIS researchers. They focus on problems and solutions in specific contexts. Their aim may be to help other practitioners facing similar problems or to solicit help and possible solutions from other practitioners (or EIS researchers). [Limit 10 Pages]
4.	Review of Literature (RoL) aim is to review of the suitable "literature" (books, journals, magazines, URLs, Videos) discussing the topic one want to investigate. It discusses modus operandi and mechanism that are apposite for investigating the subject matter just a simple summary of the sources, but it usually has an organizational pattern and combines both summary and synthesis with intent to explore gap. Objective behind creating this type of phenomenon in GJEIS is to give grassroots researcher a roof to synthesize and weigh up the guiding notion of research questions. [Limit 8 Pages]
5.	View Point (VP) is a situation for which something is pragmatic or considered as a point of view. The purpose of VP is to share different views about the IT related products and what individual think about that. [Limit 6 Pages]
6.	Research Thought (RT) can refer to the opinion or arrangement of research ideas that effect from thinking, the act of producing thoughts on diverse interdisciplinary collaborative research areas or tools with which researcher can formulate it's research paper, choose a method for undertaking a study, write up for findings and discuss the outcomes in a discussion section. In this head author can throw a light on various research tools which can be helpful in formulating a research paper. [Limit 5 Pages]

7. Student Research Initiatives (SRI) is a research initiative by a grass-root researcher and technocrats. This head facilitate students/learners to pursue independent academic and imaginative effort and engage in research under the supervision of a faculty mentor with an intention to heighten student research as a means of collaborative learning, critical thinking and the establishment of knowledge. [Limit 12 Pages]

8. Dissertation Snapshot (DS) is an excerpt from a researcher's own thesis or dissertation which had been previously published or submitted in the form of research project or its own doctoral work. The rationale is to raise the curtain on an application and thought used by researcher in a brief manner with an intention to promote the future researchers to sequel their thoughts. [Limit 10 Pages]

9. Questionnaire Format (QF) A new philosophy called "Questionnaire Format" had been introduced, in which we are going to publish distinguish questionnaires that navigates the usefulness of it in building research and how to communicate with the respondents. The rationale behind introducing this QF is to give a glimpse about the structure and the pedagogy. QF on the other hand provides a niche to grass-root researcher about their various thoughts related to preliminary research and facilitates them in linking with a respective research papers which the researcher had visualize or going to plan in a coming future. This is a new inventiveness under the GJEIS Academic Social Responsibility (GASR) and would be complimentary/charitable in nature. [Limit 5 Pages]

10. Book Review (BR) is a literary criticism in which a book is analyzed based on content, style, and merit. BR can be a primary source opinion piece, summary review or scholarly review. Books can be reviewed for printed periodicals, magazines and newspapers, as school work, or for book websites on the internet. A book review's length may vary from a single paragraph to a substantial essay. Such a BR may evaluate the book on the basis of personal taste. Reviewers may use the occasion of a book review for a display of learning or to promulgate their own ideas on the topic of a fiction or non-fiction work. [Limit 3 Pages]

11. Biographical Note of the Luminary in an Area of IS We as per our culture acknowledge in every issue a great leader, Entrepreneur, Technocrats, Academician etc., who contribute a lot to a society in an area of IS. [Limit 2 Pages]

12. Great Enterprise Contribution to Society in Information System Perspectives deals with those enterprises contributing a lot to the society, and considering themselves a wizard in the field of Information System, we publish their profile, with the intention that their creation/contribution would be viewed and duly appreciated by the corporate and academics, all-around the globe. The purpose behind this is to broadcast the most visually powerful, immersive and engaging rich media applications on the Web. [Limit 2 Pages]

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14. Homage means great respect and tribute, or something done to honor a person. We in GJEIS pay homage to our ancestor's and say prayers in admiration to their memory which includes academicians, technocrats and great thinkers. The special respect would be shown publicly by sharing their achievements and contributions in writing which includes images, excerpts, testimonials, write-up, etc. [Limit 2 Pages]

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4. There will be a waiting time of minimum **12 months** from the date of submission i.e. April 2019, as paper require rigorous review by **3 internal reviews** from India and **3 blind reviews from outside India** based on the subject expertise and themes.
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Subodh K. Kesharwani

Editor-In-Chief
Notified Tenure 2018-2020

Fast track journals are crucial for research articles that are amazingly noteworthy and necessitate essential propagation, or where there is a funding policy raison d'être for urgent publication. Fast-track peer review prioritizes a manuscript and decreases its publication time. GJEIS offers this opportunity by fast tracking as just speedy review and quick publishing. When a paper is marked for fast track during submission line www.gjeis.com it is recurrently reviewed and a publication decision is made swiftly. Fast tracking might also shrink the amount of time allocated for peer review and editing as it will parallel send to blind and peer reviewer and constantly dedicated publishing team would be allocated simultaneously. It typically cuts the overall publication time by at least one-third.

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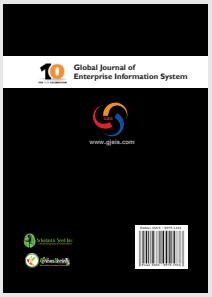
- If the Editorial Board thinks that the submitted articles are exceptional in nature and sound good amount of research then to facilitate and acknowledge the author, editorial board automatic initiate waiver partially or fully by exempting fees levied under FTPS. Thus these academic responsibility initiatives would facilitate in safeguarding the author in newly developed concept.
- Article having Zero% Plagiarism checked by iThenticate a plagiarism detection service with a research orientation automatically comes under waiver list and published within 9 Weeks from the date of Submission or generation of DOI from Crossref USA www.gjeis.com

Note

This facility is an optional service, hence the price quote would be based on article-to-article and would be intimated by the editorial office depend on the submission and subject to aforementioned points under waiver list

Disclaimer

GJEIS is a Peer Review restricted access subscription base Research Journal started in a year 2009 and does not charged any fees or Article Processing Charges(APC) from the author during or after publication. Fast Track Publication service (FTPS) is an optional service which had been originated to facilitate the submitter to reduce the time-frame and helping in strengthen their rights.



Scholastic Seed Inc. is in the e-publishing business from last one decade. The first creation the group had originated was the Peer Review Research Journal founded in the year 2009 known as Global Journal of Enterprise Information system (GJEIS). At the later stage group has come up with a sequel in the form of a medical journal in collaboration with it academic and research consortium NGO, KARAM Society & MEDANTA Hospital doctors in a name of AGEMS (Annals of Geriatric Education and Medical Sciences). The consortium currently having contemporary out-of-box approach and are now well acknowledge as an e-publishing aggregator and periodical mentor. The company till date had published few journals and facilitates/consulted lots of Brick-&-Mortar periodcials into a digital dynamic format. Till date we had consulted 20 periodical and entered into a book publishing business.

Journal Initiated under Scholastic Seed Ambit

GJEIS-2009
KARAM Society & Informatics Publishing Ltd.

AGEMS-2014
KARAM Society & Innovative Publications

SIRIFORT-2018
Sirifort Institute of Management Studies & KARAM Society

CYBERNOMICS-2018
Scholastic Seed Inc. & KARAM Society

E-GOVERNANCE-2018
Scholastic Seed Inc. & KARAM Society

Scholastic Seed helps to scholar in publishing Paper in an impact factor indexed journal

When a scientific paper, dissertation or thesis is published the author(s) have a duty to report who has contributed to the work. This recognition can take several forms such as authorship, relevant acknowledgments and by citing previous work. There is a growing industry where publication consultants will work with authors, research groups or even institutions to help get their work published, or help their dissertation/thesis. This help can range from proof reading, data collection, analysis (including statistics), helping with the literature review and identifying suitable journals/conferences.

- Plagiarism Check by (iThenticate, turnitin,Plag scan, Urkund)
- Language, Grammar Check, Punctuation Check, Writing Style Check, References Check
- Rearrangement, expansion, or summarizing of sections
- Ensuring logical flow between sentences and paragraphs
- Cross-checking appropriateness and presence of sections
- Content Accuracy & Enhancement, Logical Flow
- Specialized Subject-area Matching
- Formatting and Artwork Editing
- Enhanced Pre-submission Peer Review
- Journal Selection and Submission
- Review Correction and Re-Submission
- Confirmed Journal Publication

What will happen if you don't involved an aggregator and publishing mentor like scholastic seed?

- If you will involve your own intellectual capital in whom you're spending lucrative amount per month. The in-house team will not commit fully due to other obligation and teaching assignment. On the other hand Scholastic team facilitate in doing your job from underneath to pinnacle with the same cost and do some add-on like applying Algorithm and Citation, mentoring of in-house team in the same institution at later stage and make this e-publishing auto mode with a span of time.

How the Credit ability of an institute deteriorated without periodicals

- As we know that Institution creditability would be judged on the basis of the periodicals they published as these periodicals such as newsletters, journals, magazines, annual reports, etc are their front face and if these front face are digitally equipped it would be definitely a win-win stage for the students and the institutions and further by adding a feather in a cap.

Why there is a need of Online Periodicals

- Free access • Self-archiving • Repository • Author foot fall • Pre or post publication irrational fear Eradication

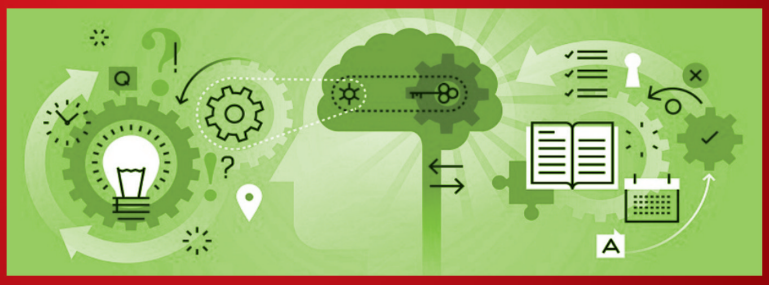
DO's AND DON'T

- Digital Publication is as good as print publication
- Always Prefer Open Source Journal and Digital Format as it circulate fast and perpetual in nature.
- Have a Digital Object Identifier (DOI)
- Have a good team of editorials and reviewers
- Google Scholar and Citation is an important ingredients for choosing a journal
- Scopus, ICI, WoS and UGC Listing is a parameter to select journal
- Always check the H-index of an author
- Know the Impact factor of journal before Publishing an article
- Check the Ethical issue and Privacy Policy of the journal
- Frequency and consistency would be an important ingredient to judge the creditability

- It is suggested to an editor not to publish anything without Originality check
- Don't Prefer Pay and Print Model

Services

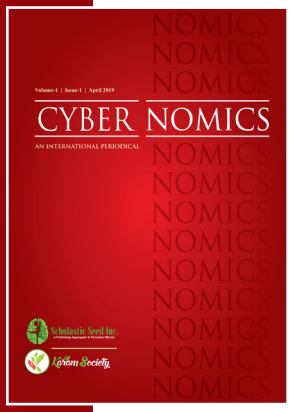
How Scholastic Seed Involved with institution in E-publishing and Journal making



- Website Creation includes coding in PHP and SQL Database Ready-to-Run Software with a Source code right transfer model.
- Sub-domain and hosting on a pro-rata basis (domain and hosting will be given to the respective institute with an ownership transfer)
- Digitalizing the Content Electronically and Uploading on Web (Frequency: Monthly, Quarterly, Bi-annually & Annually)
- Online tracking of articles submitted.
- Online manuscript submission.
- Updates about your manuscript delivered via e mail and SMS.
- Blind Peer-Reviewed Format and pedagogy to accomplish
- Facilitate in Papers abstract/indexed by all the major scientific indexing services.
- Aligned with various Impact Factor agency
- Converting Text into PDF and Final Camera Ready Shape(CRC)
- Call For Paper Arrangement of Article Plag Check, Interaction with Author, Proof Reading
- Other Indexing would be done by the society/ Scholastic Seed Inc. time-to-time, but other expenditure incurred would intimate and levied accordingly if charge by the agency on time-to-time basis.
- Process for Both eISSN and ISSN and Documentation
- Facilitate in Getting RNI No. From Registrar Of Newspapers For India

CYBER NOMICS

CYBERNOMICS is being published as a co-published peer-reviewed magazine by KARAM Society and Scholastic Seed Inc. The subjects covered by the magazine are IT linkages in business and management and others field related to cyber and its economics fields. It also covers many aspects in Information System and related areas which are burgeoning. The Magazine provides an international forum for the exchange of ideas, principles and processes concerning the application of diverse topics of Cyber to organizations, institutions and the world at large. CYBERNOMICS considers research submissions in several categories but revolves around Cyber threats, Security remedies, etc.



CYBERNOMICS magazine aims at achieving the growing demands for understanding and addressing issue pertaining to real-worlds Cyber-Attacks, Cyber Threats, Cyber threat Intelligence, Cyber Warfare, Cyber Terrorism, Darknet and Crypto Currencies and threats to information infrastructures critical to the national security of country.

The magazine publishes articles and reviews in the areas including, but not limited to:

- Cyber Threats
- Cyber Warfare
- Darknet and Darkweb
- Cryptography and its applications
- Network and critical infrastructure security
- Hardware security
- Software and System security
- Cybersecurity data analytics
- Data-driven security
- Adversarial Reasoning
- Malware Analysis
- Privacy-enhancing technologies and anonymity
- IoT Security
- Blockchain Security
- Cryptocurrencies
- Machine Learning
- Big Data Analytics
- Artificial Intelligence

Global Journal of Enterprise Information System

GJEIS Indexing till 2019

GJEIS in collaboration with Scholastic Seed Inc. and KARAM Society, publishes a new peer-reviewed open access e-journal in Enterprise Information System (EIS) areas of business which covers IT linkages in business, finance, marketing, management, organizational behaviour, buyer behaviour and other relevant fields. It also covers many aspects in Information System and related areas. The journal provides an international forum for the exchange of ideas,principles and processes concerning the application of diverse topics of EIS to organizations, institutions and the world at large. GJEIS considers research submissions in several categories but revolves around three buzzwords Enterprise Information and System Journal takes into consideration professional plagiarism detection and prevention technology for it's scholarly publication and research article in order to ensure the originality of written text before publication. The GJEIS receives submissions only through it's journal website www.gjeis.com. The journal has a very good impact factor and is listed and indexed in almost fifty directories and libraries all around the globe. GJEIS is also a scholarly publisher that uses services of Crosscheck offered by CrossRef, USA and facilitated by iThenticate software. The journal had implemented a Search Engine Optimization (SEO) and web analytics dedicatedly for it's online portal to provide glimpse about the articles having highest citation. GJEIS is also associated with International DOI Foundation (IDF) USA. GJEIS is also concomitant of Publsher International Linking Association, Inc (PILA) a not-for-profit membership organization. USA.

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Deep Learning Architectures is a class of Machine Learning Algorithms

11TH ANNIVERSARY

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