ISSN (Online) : 0975-1432
ISSN (Print) : 0975-153X
DOI: 10.18311/gjeis

Vol 3 | Issue 1 | Jan-Mar 2011

global Journal of ENTERPRISE INFORMATION SYSTEM

GJEIS

Dr. Subodh Kesharwani
Editor-In-Chief

www.gjeis.com

Co-Published

Scholastic Seed Inc.
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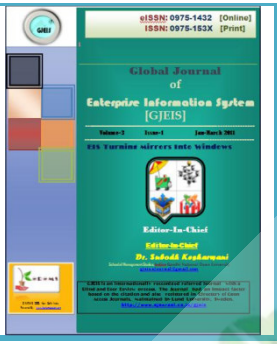

Message From the Desk of Editor-in-Chief

Dr. Sohdh Kesharwani
Editor-in-Chief [GJEIS]
1st April 2011

Another fruitful year has passed, and I am pleased to share our achievements done in 2010, and to discuss our developments for 2011 with the readers of GJEI$, as learning can go on and on.

Right from the inception the mandate of GJEI$ is to disseminate, so that it can reach to maximum and serve the masses about the latest happenings in Information systems. The open source software in this respect had played a vital role in diffusion. It is really a great platform for the academician like us. From this year i.e. 2011 we had made a journal quarterly and coming up with first issue which revolves again on EI$. There were certain alliances with an online database such as EB$CO which considered as a host Online Research Databases www.ebscohost.com

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I once again appreciative for your support and endeavor to furnish GJEI$ to enormous height and broaden into information based **archive in order to benefit academia and industry**

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An Overview of ERP in Indian Production Firms

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ABSTRACT

Over the past nearly two decades, firms have increasingly invested in enterprise resource planning (ERP) systems to manage their information needs. Firms in developed countries account for the bulk of ERP deployments worldwide. In the past few years there has been increasing penetration of ERP in developing countries. The extent of ERP implementations among firms in developed countries is a well researched issue. In contrast, very few studies have examined the extent of ERP deployments in developing countries. In this study, we address the above research gap by presenting a rigorous empirical assessment of ERP implementations in Indian production firms. The implementation status of different ERP modules, performance benefits and the influence of critical success factors (CSFs) are key issues examined in this study.

KEYWORDS

CSFs, Performance | ERP
Indian Production Firms | Organization Size

PREAMBLE

Increased globalization has forced firms to invest in information technology (IT) to meet their global information needs. In particular, more and more firms across the world are implementing packaged enterprise resource planning (ERP) systems. ERP systems collect data through a single comprehensive database and make it available to modular applications that support all of a firm's value chain activities across functions, business units, and geographical areas (Davenport, 1998; Klaus et al., 2000). The rise in the popularity of ERP systems worldwide can be gauged from their rapid growth – $1 billion in 1990 (Mabert et al., 2000) to over $400 billion by 2006 (Bonasera, 2000; Gartner, 2003; IDC India, 2003; IDC, 2004; Reilly, 2005; Jacobson et al., 2007). The worldwide ERP market continues to grow at an annual rate of over 10% with revenues reaching $65 billion in 2008, and an estimated $61 billion in 2009, and $65 billion in 2010 (D'Aquila et al., 2009).

Firms in developed countries account for the bulk of ERP deployments worldwide (Mabert et al., 2003; Datamonitor, 2005) and most ERP system research focuses on implementations in the developed markets. It is only in the past few years that there has been an increasing penetration of ERP systems in developing markets and hence there is a paucity of studies that have examined the extent of ERP deployments in developing countries. Researchers attribute the rapid growth of ERP in developed markets in the 1990s due to their having built up a mature stock of ERP-related infrastructure requirements that support economic activity thus leaving room for productive ERP investment (Chandra and Sastry, 1998; 2002; Dewan and Kraemer, 2000; Huang and Palvia, 2001). Further, their studies suggest that the slow growth of ERP in developing markets, such as India, in the 1990s is due to their having to build up their basic ERP and complementary infrastructure before they can implement and begin to realize the benefits of ERP-related investments. In this study, we address the ERP research gaps in a developing market – India – and present a systematic and rigorous empirical assessment of ERP implementations in Indian production firms.

There was very low penetration of ERP systems in India till the mid-1990s with the market valued at about $3 million in 1995-96. The late 1990s witnessed higher growth rates, with the Indian ERP market growing at a compounded annual growth rate of 20 to 30% to reach $54 million in 2001 (De, 2001). Apart from a brief slump in the early 2000s, the Indian ERP market has been on a high growth trajectory clocking compounded annual growth rates of more than 10% to reach $83 million in 2004, $197 million in 2007, $241 million in 2008, and $260 million in 2009 (De, 2008; Chawla, 2009). The Indian ERP market is expected to reach $341 million in 2012 according to industry research analysts International Data Corporation (IDC) and Arc Advisory (Askari, 2007; De, 2007; Boparai, 2008).

Due to the relative newness of the ERP field in India and the rapid advances in ERP technologies, practitioner-oriented articles dominate literature. Descriptive and case studies form the bulk of Indian ERP research and empirical work is limited. Most studies have examined ERP issues – modules implemented, critical success factors (CSFs) emphasized, benefits realized – separately using a piecemeal approach and systematic studies with scientific rigor are by and large absent. Besides the above, the high incidence of problematic and delayed implementations in Indian firms also calls for a pan-Indian study on ERP deployments. De (2004) indicates that the average cost overrun among Indian ERP system implementers is 178 %, the average schedule overrun is 230% percent of original expectations, and the average decline in functional improvements is 59%. His study further indicates that 90% of ERP system deployments in India are problematic implementations.

Most researchers view the evolution of ERP systems from a manufacturing perspective – from materials requirements planning (MRP) to manufacturing resources planning (MRP II) to ERP (Rondeau and Litteral, 2001; Jacobs and Weston, 2007). Hence, most ERP systems are initially implemented in production firms (Mabert et al., 2000; Olhager and Selldin, 2003; Wang et al., 2005). The above suggests that production firms would account for the bulk of ERP system implementations in India. Gartner (2003) estimates the ERP penetration levels in the Indian manufacturing industry to be about 37%, customer relationship management (CRM) about 15%, and supply chain management (SCM)

about 10%. Recent studies by Forrester Research indicate that investments in ERP, SCM, and CRM by the manufacturing sector accounts for the majority of enterprise application spending in India (Pasha, 2008). The above findings lend support to the identification of production firms as the sample population for this study.

RESEARCH METHODOLOGY

This research used survey methodology to obtain data from Indian firms across a variety of production environments. An integral part of the research involved the development of a questionnaire to maximize understanding of ERP implementations among academicians and practitioners. Dillman's (2000) tailored design method (TDM) for constructing the questionnaire was followed to the extent possible. The initial questionnaire was developed from a synthesis of ERP as well as other relevant system studies. Inputs from two international focus groups of eight academicians and eight practitioners, a pre-test using a graduate ERP class in India, and a pilot study in an Indian production firm that had implemented ERP were used to develop and validate the questionnaire. Feedback from the focus and respondent groups was incorporated at each step of the questionnaire development process and allowed for an incremental and comprehensive development of the survey instrument. The final questionnaire collected information pertaining to five areas: business unit characteristics, respondent characteristics, implementation status of ERP modules, critical success factors to facilitate the ERP deployment process, and benefits obtained from the ERP implementation.

The 2,937 production firms represented in the Confederation of Indian Industry (CII) member directory and a list of 240 production firms from other media sources served as the target population for this study. The CII is India's apex business association and its member firms can be considered to be leaders in the use of IT systems such as ERP. Dillman's (2000) mixed mode TDM survey methodology was followed to the extent possible. Telephone calls were made to each of the 3,177 firms to ascertain whether the firm had implemented an ERP system, whether the firm was willing to participate in the survey, and who would be the best person in the firm to send the survey instrument to and their contact details. This approach resulted in the selection of the names of 900 firms from the target population. Two mailings of the questionnaire were made. Of the surveys mailed in the two waves, a total of 231 responses were returned for a response rate of 25.67%. The figure 1 given below shows the research methodology employed.

Literature Review and identification of key study variables

Questionnaire Development (using Dillman's TDM method)
Selection of questionnaire items from literature to measure variables
Questionnaire review by international focus group of academicians (N = 8)
Questionnaire review by international focus group of ERP consultants (N = 8)
Questionnaire review by graduate MBA (ERP) class (N = 29)
Questionnaire review by pilot study firm (N = 72)

Purposive sampling method to extract names of production firms, identified as having implemented ERP, from the Confederation of Indian Industry (CII) member directory and other media sources

Use of Survey Methodology (using Dillman's mixed mode TDM method)

Pre-notice Letter sent to firms that have implemented ERP (N = 900)

Telephone Reminders made to all the second wave respondents two weeks after the second mailing date Second wave response (N = 104)

Total response (N = 231) for a response rate of 25.67% On obtainment of this satisfactory response rate, all additional mailings/contacts discontinued

Review of returned questionnaires for accuracy and completeness

Data Analyses

Thank you/Reminder Note sent by postal mail as well as email one week after the first wave mailing date First wave response (N = 127)

Figure 1: Research Methodology

An examination of the 231 completed questionnaires revealed that 12 firms were yet to go live with their ERP systems and their responses were discarded. Three additional questionnaires were discarded

because they missed most of the data on key items. Since the focus of this study is on investigating ERP system implementations in production firms, the 216 remaining responses were evaluated based on the firm's level of manufacturing activities. A frequency distribution revealed that firms with 70% or more of their sales coming from production activities was a logical cut-off point to categorize firms as a majority of sales coming from production activities. This approach resulted in the omission of an additional 13 responses that represented primarily service firms. Only firms that realized 70% or more of their sales from production activities were included in the sample and thus the final dataset for analysis comprised of 203 responses.

SURVEY RESULTS: ENTERPRISE CHARACTERISTICS

The data pertaining to the characteristics of the sampled firms are summarized in Table 1.

The results in Table 1 indicate that the sample is a good representation of the Indian production sector comprising of firms of different sizes. The size of the firms was assessed in terms of the number of employees. The number of employees over 1,000 is the category most frequently represented and accounts for 41.4% of the sample. This, together with the number of employees in the 500 to 999 category, represents 66% of the sample. The number of employees in the two categories 0 to 99 and 100 to 249 account for only 14.3% of the sample.

Table 1: Enterprise Characteristics

Number of Employees	*Frequency*	*Percent*
0-99	4	**2.0**
100-249	25	**12.3**
250-499	40	**19.7**
500-999	50	**24.6**
Over 1000	**84**	**41.4**

Sector	*Frequency*	*Percent*
Private	167	**82.3**
Public	32	**15.8**
Joint	**4**	**2.0**

Origin	*Frequency*	*Percent*
Multinational	40	19.7
Indian	157	77.3
Joint Venture	6	3.0

Union Status	*Frequency*	*Percent*
Unionized	45	**22.2**
Non-Unionized	47	**23.2**
Both	**111**	**54.7**

Table 1 (contd.): Enterprise Characteristics

Industries	*Frequency*	*Percent*
Automotive	44	**21.7**
Machinery and Equipment	20	**9.9**
Basic Metal/Coal/Lignite/ Uranium /Thorium/Others	13	**6.4**
Electronic/Telecommunication Equipment	11	**5.4**
Apparel and Textiles	11	**5.4**
Food Products & Beverages	11	**5.4**
Coke/Crude/Petroleum/Natural Gas/Others	9	**4.4**
Fabricated Metal Products	7	**3.4**
Rubber/Plastic Products	5	**2.5**
Paper and Paper Products	5	**2.5**
Others	67	**33.0**

Production Environment	*Percent of Products Produced*
Make-to-Order	**61.8**
Make-to-Stock	**38.2**

Production Flow Type	*Percent of Products Produced*
Project	**20.0**
Job Shop	**13.9**
Batch	**22.0**
Repetitive	**26.4**
Flow	**17.7**

Type of ERP System Implemented	Frequency	Percent
Single Vendor ERP System		
SAP	60	29.6
Oracle/PeopleSoft	21	10.3
SSA Global/Baan	9	4.4
Microsoft	9	4.4
Ramco	8	3.9
QAD	5	2.5
ESS	5	2.5
Others	15	7.4
Best of Breed ERP System		
SAP & Oracle/PeopleSoft	2	1.0
SAP & SSA Global/Baan	2	1.0
Others	10	4.9
In-House Developed ERP System		
In-House Developed ERP	57	28.1

More than half the firms in the sample have a mix of both unionized and non-unionized environments and represent 54.7% of the sample. The firms constituting the remaining part of the sample are more or less evenly distributed between unionized (22.2%) and non-unionized (23.2%) environments. Studies indicate that unions could affect the implementation of ERP systems (Rose et al., 2005; Vijayabaskar, 2005); however, the results indicate that unions are not a compounding factor in Indian ERP deployments. Most of the sampled firms belong to the private sector and represent 82.3% of the sample. Thirty two public sector firms responded to the survey and form 15.8% of the sample. Joint sector firms account for 2% of the sample. This is in accordance with past research, which suggests that the private sector drives IT growth in India and accounts for over 70% of the total IT investment in the country (Chandrasekhar, 2005). A majority of firms are of Indian origin and comprise 77.3% of the sample. Multinational firms of foreign origin represent 19.7% of the sample while joint ventures constitute 6% of the sample. A wide variety of industries are represented in the sample. The majority of industries (67%) fall into one of ten major industry groups. Firms in the automotive industry are the most frequently represented group accounting for 21.7% of the sample.

Make-to-order was the primary production system used by firms in the sample. The mean percentage of products produced with a make-to-order (MTO) system was 61.8%; 38.2% of the products were produced with a make-to-stock (MTS) system. The sample data indicates that most firms employed a mix of different production processes; however, many firms also employed only one production process. Firms using the repetitive production process (26.4%) formed the largest mean percentage of the sample. Firms were more or less evenly distributed between the batch process (22.0%) and the project process (20.0%) types. The flow process type had a mean percentage of 17.7% and the job shop type 13.9%.

Table 1 also provides the frequency distribution for firms by the type of ERP system implemented. The table indicates that the majority of the firms implemented a single vendor ERP system representing 65% of the sample. SAP is the most dominant ERP system implemented by 29.6% of the sampled firms. This is followed by Oracle/PeopleSoft accounting for 10.3% of the sample, SSA Global/Baan and Microsoft representing 4.4% of the sample each, and Ramco comprising 3.9% of the sample. The other major ERP vendors are QAD and ESS, together representing 5.0% of the sample. A small number of firms have implemented two or more Best-of-Breed (BoB) ERP systems accounting for 6.9% of the sample. In-house developed ERP systems represent the second most dominant ERP system implemented among the sampled firms accounting for 28.1% of the sample. The above distribution, with the exception of in-house developed ERP systems, is similar to that seen in well developed ERP markets. For example, Mabert et al. (2000) indicates that single vendor ERP implementations, with SAP as the dominant ERP system (25%) adopted, account for the bulk of ERP deployments in the US production sector. Their study further indicates that BoB systems account for a small portion (9.8%) of the ERP systems in use.

RESPONDENT CHARACTERISTICS

The respondents' characteristics are given in Table 2. The respondents to the survey provided both their total number of years of work experience as well as years of work experience in the present firm. For ease of presentation, however, as shown in the first two parts of the table, responses were grouped into one of three categories: less than 5 years, 5 to 10 years, and over 10 years. The majority of the respondents possess more than 10 years of work experience accounting for 92.1% of the sample. The most frequently reported category is that of respondents with more than 10 years of work experience at the present firm accounting for 56.7% of the sample. The next highest category is respondents with less than 5 years of experience forming 29.5% of the sample. Twenty eight respondents have been with the same firm between 5 to 10 years and account for 13.8% of the sample.

Table 2: Respondent Characteristics

Total Experience	*Frequency*	*Percent*
Less than 5 years	6	3.0
5 to 10 years	10	4.9
Over 10 years	187	92.1

Experience with Present Organization	*Frequency*	*Percent*
Less than 5 years	60	29.5
5 to 10 years	28	13.8
Over 10 years	115	56.7

Current Position	*Frequency*	*Percent*
Top Management	103	50.7
Middle Management	81	39.9
Lower Management	8	3.9
Team Leaders	7	3.4
Others	4	2.0

Current Work Area	*Frequency*	*Percent*
Finance	15	7.4
Production	2	1.0
Marketing	4	2.0
Information Technology/Systems	175	86.2
Others	7	3.4

Level of Education	*Frequency*	*Percent*
Bachelor's degree	78	38.4
Master's degree	120	59.1
Doctorate	3	1.5
Others	2	1.0

About half the respondents belong to the top management category and constitute 50.7% of the sample. The next highest category of respondents is middle management and represents 39.9% of the sample. Lower management and team leaders account for 3.9% and 3.4% of the sample respectively. A majority of the respondents work in the information technology/ information systems area and represent 86.2% of the sample. Finance is the next highest work area reported and accounts for 7.4% of the sample. The other two functional areas reported are marketing and production accounting for 2% and 1% of the sample respectively. A majority of the respondents posses a master's degree and account for 59.1% of the sample. Seventy eight respondents have completed their bachelor's degree and represent 38.4% of the sample. Three respondents have reported completion of a doctoral degree and constitute 1.5% of the sample.

ERP IMPLEMENTATION STATUS

The average time in years since implementation began and the frequencies of implementations varied among the fourteen ERP modules in the sample. The average time in years since implementation began for each of the ERP modules was determined by first assigning values based on the midpoint of the scale ranges and then calculating the means of the assigned values for each of the modules. The means represent a relative measure for average time in years since implementation began for each ERP module or the length of time each ERP module has been in use. Past research on implementations such as Just-In-Time (JIT) systems (White et al., 1999; Chong et al., 2001) and quality systems (Berry, 1996) have similarly derived relative measures for average time in years since implementation began for JIT practices and quality practices respectively. Table 3 summarizes the respondents' answers to questions pertaining to their ERP implementation status.

Table 3: ERP Implementation Status

ERP Modules	Average Time in Years Since Implementation*	Number of Organizations with Module Implemented	Percent of Organizations with Module Implemented
Materials Management	3.66	197	97.0
Financials	3.61	189	93.1
Sales & Distribution	3.40	182	89.7
Production Planning	2.96	163	80.3
Quality Management	2.24	134	66.0
Controlling	2.23	125	61.6
General Logistics	1.84	100	49.3
Human Resources	1.72	117	57.6
Plant Maintenance	1.55	95	46.8
Supply Chain Management	1.02	62	30.5
Project System	0.92	63	31.0
E-commerce	0.45	34	16.7
Advanced Planner Optimizer/Scheduler	0.42	34	16.7
Customer Relationship Management	0.38	40	19.7

Note: N = 203

* Scale: Not implemented, Implementation started within the last year, Implementation started one to three years ago, Implementation started three to five years ago, and Implementation started more than five years ago.

The high extent of usage of ERP modules covering the financial and logistics areas of the sampled firms show remarkably similar trends with those in advanced ERP markets (Mabert et al. 2000). The data in Table 3 indicates that the module most implemented (197 firms) and with the highest extent of usage (3.66 years) was materials management. The second most frequently implemented module was financials (189 firms) with an average time since implementation began of 3.61 years. A majority of firms have also implemented the sales and distribution module (182 firms) with the extent of usage being 3.40 years. The customer relationship module (CRM) is the most recent module (.38 years) deployed by a small number of firms (40 firms). The second least frequently implemented module (42 firms) was advanced planner optimizer/ advanced planner scheduler (APO/APS) with an average time since implementation began of .42 years. Only 45 firms have implemented the electronic-commerce module (E-Commerce) with the extent of usage being .45 years. The above findings are in tune with past ERP research, which suggests that firms first automate intra-firm activities before implementing modules that cater to inter-firm activities (Mabert et al., 2000; Shields, 2001; Olhager and Selldin, 2003).

ERP PERFORMANCE BENEFITS

A majority of the respondents (82.3%) indicated that ERP provided an overall net performance benefit for their firm. Only 9.4% reported no overall net performance benefit from deployment of ERP. The remaining 8.3% indicated obtainment of partial performance benefits as it was too early in the implementation process to measure an overall net performance benefit. The changes in performance measures attributable to ERP were recorded on a Likert type scale ranging from 1 (Disagree) to 7 (Agree). Table 4 summarizes the mean, median, and mode responses to questions pertaining to the benefits attributable to the firms' ERP implementations.

Table 4: ERP Performance Benefits

Performance	Mean*	Median	Mode
Information Availability	6.35	7.0	7.0
Information Quality	6.24	7.0	7.0
Standardization	6.05	6.0	7.0
Inventory Management	5.97	6.0	7.0
On-Time Delivery	5.91	6.0	7.0
User Satisfaction	5.83	6.0	6.0
Profitability	5.43	5.0	5.0
Return on Investment	5.43	6.0	6.0
Customer Satisfaction	5.38	6.0	6.0
Competitive Advantage	5.15	5.0	5.0

Note: * Scale: 1 to 7, "disagree" to "agree"

The data in Table 4 indicates that the maximum benefit derived by firms from implementing ERP systems was an increase in information availability. This was closely followed by increases in information quality and then standardization. The performance measure that registered the least improvement was increase in

competitive advantage. The above findings are in accordance with past ERP research, which suggests that most firms initially derive informational benefits from their ERP implementations (Mabert et al., 2000; Mabert et al., 2003; Olhager and Selldin, 2003). ERP information is then leveraged to improve operational performance measures such as inventory and on-time delivery. Efficiency in operations in turn leads to financial and organizational benefits (Mabert et al., 2000; Tarafdar and Roy, 2003; Hawking and Stein, 2004).

ERP CRITICAL SUCCESS FACTORS

The influence of CSFs on the ERP implementation were recorded on a Likert type scale ranging from 1 (Disagree) to 7 (Agree). Table 5 summarizes the mean, median, and mode responses to questions pertaining to the CSFs influencing the firms' ERP implementations. The role of communication in facilitating the ERP implementation was rated the highest. This was closely followed by data accuracy and then implementation team support. Respondents rated the influence of national culture the least among all the CSFs. The above findings are aligned with past research, which suggests that CSFs that pertain to organizational support and data integrity are crucial for successful deployment of ERP systems (Stratman and Roth, 2002; Kumar et al., 2003; Guido et al., 2007).

Table 5: ERP Critical Success Factors

Critical Success Factors	*Mean**	*Median*	*Mode*
Communication	6.42	6.7	7.0
Data Accuracy	6.18	6.5	7.0
Implementation Team	6.09	6.5	7.0
Project Management	5.85	6.2	7.0
Top Management Support	5.81	6.2	7.0
Alignment	5.80	6.0	7.0
Training	5.64	6.0	7.0
User Support	5.59	5.8	7.0
Planning	5.56	5.3	6.5
Consultants	5.42	5.7	7.0
Organizational Culture	5.20	5.4	6.0
Learning	5.10	5.3	5.5
National Culture	4.94	5.0	5.0

Note: * Scale: 1 to 7, "disagree" to "agree"

ERP and Organization Size

Mabert et al. (2003) indicates that organization size plays an important role in ERP implementations. Their study suggests that firms of different sizes tend to do different things in their implementations leading to different outcomes and benefits. In this section, we examine the experience of Indian production firms on three key issues - implementation status, CSFs, performance benefits – across organizations of different sizes. In tune with past research (Kimberly, 1976; Yasai-Ardekani, 1989; Swamidas and Kotha, 1998), in this study we use number of employees as a measure of organization size.

The average time in years since implementation began and the frequencies of implementations varied among the fourteen ERP modules across different organization size categories ranging from 1 (smallest) to 5 (largest) (see Table 6). Table 6 summarizes the ERP implementation status of the sampled firms according to organization categories.

Table 6: ERP Implementation Status by Organization Size

ERP Modules	Organization Size Category*									
	Category 1		Category 2		Category 3		Category 4		Category 5	
	Average Time in Years^ and Percent Since Implementation									
	Time	%	Time	%	Time	%	Time	%	Time	%
Materials Management	2.13	100.0	3.50	88.0	3.24	92.5	3.50	98.0	4.08	97.6
Financials	2.26	75.0	3.48	84.0	3.00	90.0	3.58	94.0	4.01	94.0
Sales & Distribution	2.50	75.0	3.16	84.0	2.79	85.0	3.23	90.0	3.91	96.4
Production Planning	2.00	75.0	3.02	80.0	2.44	75.0	2.64	72.0	3.44	88.1
Quality Management	2.13	75.0	2.44	68.0	1.29	60.0	2.10	60.0	2.73	71.4
Controlling	2.00	50.0	1.67	56.0	1.08	42.5	2.36	60.0	2.88	73.8
General Logistics	0.13	25.0	1.46	44.0	1.25	45.0	1.42	44.0	2.57	57.1
Human Resources	0.50	25.0	2.08	72.0	1.65	60.0	1.65	50.0	1.74	58.3
Plant Maintenance	0.13	25.0	1.32	48.0	0.99	42.5	1.54	40.0	1.96	53.6
Supply Chain Management	0.50	25.0	1.62	40.0	0.91	25.0	0.70	24.0	1.11	44.5
Project System	0.13	25.0	0.76	28.0	0.50	20.0	0.70	20.0	1.35	44.0
E-commerce	0.0	0.0	0.68	28.0	0.26	12.5	0.29	12.0	0.58	19.0
Advanced Planner Optimizer/Scheduler	0.13	25.0	0.68	28.0	0.11	5.0	0.22	10.0	0.63	22.6
Customer Relationship Management	0.13	25.0	1.08	36.0	0.24	12.5	0.22	14.0	0.34	21.4

Note: * Category 1 = less than 99 employees (n = 4), Category 2 = 100 to 249 employees (n = 25), Category 3 = 250 to 499 employees (n = 40), Category 4 = 500 to 999 employees (n = 50), and Category 5 = greater than 1000 employees (n = 84)

^ Scale: Not implemented, Implementation started within the last year, Implementation started one to three years ago, Implementation started three to five years ago, and Implementation started more than five years ago.

The data in Table 6 indicates that the materials management module has the highest extent of usage and is the one most often implemented among firms in categories 2, 3, and 5. The financials module has the highest extent of usage and is the one most implemented among firms in categories 1 and 4. A majority of firms across all size categories have also implemented the sales and distribution module. The CRM, APO/APS, and E-Commerce modules are least often implemented across all organization categories. The results in Table 6 indicate that none of the firms in category 1 have deployed the E-Commerce module. The above findings suggest that large firms are early adopters of ERP systems followed by medium and small firms. The extent of usage of different modules for large firms reveals that firms initially implement modules that cover intra-firm areas such as financials and logistics. They then implement the next wave of modules such as CRM and E-Commerce to extend their ERP system to cover inter-firm areas. The results further indicate a similar usage pattern for medium and small firms.

Respondents from firms in categories 2 to 5 reported the greatest change in the information quality performance measure (see Table 7). This was closely followed by changes in the information availability measure. The above suggests that most firms in categories 2 to 5 are yet to leverage their informational benefits to obtain transactional and organizational benefits. Respondents from firms in category 1 reported the greatest changes in the inventory management and on-time delivery performance measures. This suggests that small firms are more flexible than their larger counterparts in leveraging ERP to address their business imperatives. Respondents from firms in categories 2 to 5 reported the least change in the competitive advantage performance measure; whereas respondents from firms in category 1 indicated the least change in the customer satisfaction performance measure. Table 7 presents the benefits attributable to ERP implementations among firms of different sizes.

Table 7: ERP Performance Benefits by Organization Size

Performance	Organization Size Category*				
	Category 1	Category 2	Category 3	Category 4	Category 5
	Mean ^	Mean	Mean	Mean	Mean
Information Availability	6.25	6.16	6.25	6.32	6.48
Information Quality	6.25	6.16	6.12	6.14	6.37
Standardization	6.0	5.92	6.10	6.00	6.10
Inventory Management	6.50	6.08	5.78	6.00	5.98
On-Time Delivery	6.50	6.04	5.80	6.00	5.85
User Satisfaction	5.75	5.88	5.98	5.58	5.90
Profitability	5.25	5.64	5.48	5.28	5.44
Return on Investment	5.25	5.32	5.48	5.18	5.61
Customer Satisfaction	4.75	5.64	5.40	5.38	5.33
Competitive Advantage	5.00	5.12	5.08	4.96	5.31

Note:

* Category 1 = less than 99 employees (n = 4), Category 2 = 100 to 249 employees (n = 25), Category 3 = 250 to 499 employees (n = 40), Category 4 = 500 to 999 employees (n = 50), and Category 5 = greater than 1000 employees (n = 84)

^ Scale: 1 to 7, “disagree” to “agree”

The role of communication and ensuring data accuracy in facilitating the ERP implementation were rated the highest across firms of different sizes. The need for implementation team support was rated higher by larger firms (categories 3 to 5) than smaller firms (categories 1 and 2). Top management support and planning was considered more

important by firms in category 1 when compared to firms in all the other categories. This suggests that centralized decision-making processes tend to drive ERP deployments in smaller firms when compared to larger firms. Respondents across firms of different sizes rated the learning and national culture CSFs as least important in facilitating ERP deployments. A majority of firms across all size categories do not accord much importance to organizational culture changes in tandem with their technical implementations. Table 8 present the CSFs that facilitate ERP implementations among firms of different sizes.

Table 8: ERP Critical Success Factors by Organization Size

Performance	Organization Size Category*				
	Category 1	Category 2	Category 3	Category 4	Category 5
	Mean ^	Mean	Mean	Mean	Mean
Communication	6.58	6.12	6.46	6.46	6.45
Data Accuracy	6.56	6.00	6.29	6.20	6.13
Implementation Team	5.75	5.82	6.06	6.01	6.25
Project Management	5.45	5.58	5.68	5.65	6.14
Top Management Support	6.05	5.88	5.46	5.69	6.00
Alignment	5.92	5.93	5.69	5.60	5.93
Training	5.70	5.24	5.51	5.57	5.86
User Support	5.75	5.41	5.51	5.45	5.76
Planning	6.00	5.27	5.62	5.32	5.73
Consultants	5.41	5.14	5.21	5.44	5.60
Organizational Culture	5.60	5.20	5.34	4.95	5.26
Learning	4.81	4.89	5.07	4.88	5.32
National Culture	4.85	5.29	5.08	4.83	4.84

Note:

* Category 1 = less than 99 employees (n = 4), Category 2 = 100 to 249 employees (n = 25), Category 3 = 250 to 499 employees (n = 40), Category 4 = 500 to 999 employees (n = 50), and Category 5 = greater than 1000 employees (n = 84)

^ Scale: 1 to 7, "disagree" to "agree"

CONCLUSIONS

The purpose of this study was to conduct a systematic and rigorous survey on ERP implementations by Indian production firms. The data collected reveal a number of interesting facts important to academicians and practitioners. The use of ERP systems is pervasive in the Indian production sector. Private sector firms are spearheading the move to ERP. The automotive industry accounts for the bulk of ERP deployments. Most firms using ERP operate in a make-to-order production environment. SAP is the dominant ERP vendor closely followed by in-house developed and deployed ERP. There is a common core of modules being implemented by a majority of firms – materials management, financials, sales and distribution, production planning, quality management, and controlling. Firms are yet to extend their ERP deployments to cover inter-firm activities. The above deployment pattern is noticeable among firms across all organization size categories.

ERP benefits are focused on quickly providing high quality information within the firm. Accordingly, firms place high emphasis on ensuring data accuracy. At the moment, barring small firms (in category 1), respondents indicate that ERP has not resulted in significant improvements in operational performance. This suggests that the benefits of ERP accruing to firms are yet to impact their external stakeholders such as customers. Most firms, however, indicate a net overall benefit from their ERP deployments. This suggests that extreme stories of failed implementations are reported in the popular press and typical beneficial outcomes are ignored. Communication and data integrity are crucial factors in facilitating implementations across firms of all sizes.

In this study, we have identified the common modules implemented, the benefits derived, and the critical success factors that firms emphasize in their ERP deployments. We also examined the above differ with respect to the size of the firm. A perusal of the study results indicates that the Indian ERP market follows remarkably similar trends to the developed ERP markets such as the US of the 1990s and the early 2000s (Mabert et al. 2000; 2001; 2003) – in terms of implementation status, CSFS emphasized, and the performance benefits obtained. The Indian ERP market remains focused on implementation issues – how to effectively meet the challenges of getting the system up and running. Most implementers are yet to focus on management issues – how to extract the maximum business benefits from the system.

This study provides a foundation for carrying out further investigations. For example, the data reveals that firms are yet to attain significant operating cost reductions and overall organizational benefits from their ERP deployments. Why is that the case? Is it a reflection of poor alignment between ERP and business processes? Have firms not instituted organizational culture changes in tandem with the technical ERP deployments? Does the extent of ERP adoption determine the level of benefits obtained? Does throwing more and more ERP modules at business problems result in those problems being solved? What should firms do to move beyond implementation and maintenance issues and focus on operational and strategic usage issues? This study is an initial step to seek answers to such questions that could help firms' leverage their ERP to achieve better business performance.

REFERENCES

i. Askari, F. (2007). "Microsoft in India." Available at: *http://www.expresscomputeronline.com/20071224/market01.shtml*.

ii. Berry, R.W. (1996). *An Investigation of the Relationship between World Class Quality System Components and Performance*. PhD Thesis, University of North Texas.

iii. Bonasera, J. (2000). "AMR Research predicts enterprise application market will reach $78 billion by 2004." Available at:*http://www.amrresearch.com/Content/View.asp?pmillid=1327*

iv. Boparai, R. (2008). "All about Enterprise Resource Planning." Available at: *http://www.techtribe.com/viewArticle.html?articleId=03a49a6a-6bda-102b-a627-000f1f68a9bf*.

v. Chandra, P. and Sastry, T. (1998). Competitiveness of Indian Manufacturing: Findings of the 1997 Manufacturing Futures Survey. *Vikalpa*, 23(3), 25-36.

vi. Chandra, P. and Sastry, T. (2002). "Competitiveness of Indian Manufacturing: Findings of the 2001 Manufacturing Futures Survey." Available at *http://www.iimahd.ernet.in/publications/data/2002-09-04PankajChandra.pdf*.

vii. Chandrasekhar, C.P. (2005). "The Diffusion of Information Technology and Implications for Development: A Perspective Based on the Indian Experience," in *ICTs and Indian Economic Development: Economy, Work, Regulation*, A. Saith and M. Vijayabaskar (eds.), CA: Sage Publications.

viii. Chawla, M. (2009). "Business Applications: Just a Patch of Red." Available at: *http://dqindia.ciol.com/content/dqtop20_09/IndustryAnalyses/2009/109081303.asp*.

ix. Chong, H., White, R.E. and Prybutok, V. (2001). "Relationship among organizational support, JIT implementation and performance." *Industrial Management & Data Systems*, 101(6), 273-280.

x. Datamonitor. (2005). "Manufacturing Applications Model." Available at: *http://www.datamonitor.com/technology*.

xi. Davenport, T.H. (1998). "Putting the Enterprise into the Enterprise System." *Harvard Business Review*, 76 (4), 121-131.

xii. De, R. (2001). "ERP is back with a bang." Available at: *http://www.expresscomputeronline.com/20011008/indtrend1.htm*.

xiii. De, R. (2004). "Manufacturing: Back on the Rebound." Available at *www.dqindia.com/dqtop20/2004/artdisp.asp?artid=60678*.

xiv. De, R. (2007). "Application: Engines of Growth." Available at:*http://dqindia.ciol.com/content/DQTop20_07/ITGaints07/2007/107080304.asp*.

xv. De, R. (2008). "Modest and Inconsistent." Available at:

xvi. *http://dqindia.ciol.com/content/dqtop20_08/IndustryOverview/2008/108080132.asp*.

xvii. Dewan, S. and Kraemer, K.L. (2000). "Information Technology and Productivity Evidence from Country-Level Data." *Management Science*, 46(4), 548-562.

xviii. Dillman, D.A. (2000). *Mail and Internet Surveys: The Tailored Design Method*. New York: John Wiley and Sons.

xix. D'Aquila, M, Shepherd, J. and Friscia, T. (2009). "The Global Enterprise Applications Software Market Forecast Update 2009-2010." *AMR Research*.

xx. Gartner. (2003). "Enterprise application software: winning in the Indian marketplace." *Gartner Research*.

xxi. Guido, C., Lelio, R. and Pierluigi, R. (2007). "A methodological approach to assess the feasibility of ERP implementation strategies." *Journal of Information Technology Management* 10 (4), 35-53.

xxii. Hawking, P. and Stein, A. (2004). "Revisiting ERP Systems: Benefit Realization." *Proceedings of the 37th. Hawaii International Conference on System Sciences*, 1-8.

xxiii. Huang, Z. and Palvia, P. (2001). "ERP Implementation Issues in Advanced and Developing Countries." *Business Process Management Journal*, 7(3), 276-284.

xxiv. IDC. (2004). "IDC Releases Top 10 Vendors in ERP Applications Market; Market Consolidation Will Continue at Gradual Pace." Available at: *http://www.idc.com*.

xxv. IDC India. (2003). "Competition Intensifies in the Indian ERP Space - Market Expected to cross 800 crores by 2006." Available at: *http://www.idcinida.com*.

xxvi. Jacobs, F.R. and Weston, Jr., F.C. (2007). "Enterprise Resource Planning (ERP) – A brief history." *Journal of Operations Management*, 25(2), 357-363.

xxvii. Jacobson, S., Shepherd, J., D'Aquila, M. and Carter, K. (2007). "The ERP Market Sizing Report 2006-2011." 2007 Market Sizing Series. *AMR Research.*

xxviii. Kimberly, J.R. (1976). "Organization size and the structuralist perspective: a review, critique, And Proposal." *Administrative Science Quarterly*, 21(4), 571-597.

xxix. Klaus, H., Rosemann, M. and Gable, G.G. (2000). "What is ERP?" *Information Systems Frontiers*, 2(2), 141-162.

xxx. Kumar, V., Maheshwari, B. and Kumar, U. (2003). "An Investigation of Critical Management Issues in ERP Implementation: Empirical Evidence from Canadian Organizations." *Technovation*, 23(10), 793-807.

xxxi. Mabert, V.A., Soni, A. and Venkataramanan, M.A. (2000). "Enterprise Resource Planning Survey of US Manufacturing Firms." *Production and Inventory Management Journal* 41(2), 52-58.

xxxii. Mabert, V.A., Soni, A. and Venkataramanan, M.A. (2001). "Enterprise Resource Planning: Measuring Value." *Production and Inventory Management Journal*, 42(3/4), 46-51.

xxxiii. Mabert, V.A., Soni, A. and Venkatramanan, M.A. (2003). "The Impact of Organization size in Enterprise Resource Planning (ERP) Implementations in the US Manufacturing Sector." *Omega – The International Journal of Management Science*, 31(3), 235-246.

xxxiv. Madapusi, A. and Ortiz, D. An Empirical Assessment of ERP in Indian Production Firms. *South West Decision Sciences Institute Annual Meeting 2010*, Dallas.

xxxv. Olhager, J. and Selldin, E. (2003). "Enterprise Resource Planning Survey of Swedish Manufacturing Firms." *European Journal of Operational Research*, 146(2), 365-373.

xxxvi. Pasha, A. (2008). "Bull Run Continues in EAS." Available at: *http://www.expresscomputeronline.com/20080331/anniversaryspecial10.shtml*.

xxxvii. Reilly, K. (2005). "AMR research releases ERP market report showing overall market growth of 14% in 2004." Available at: *http://www.amrresearch.com/Content/View.asp?pmillid=1835*

xxxviii. Rondeau, P.J. and Litteral, L.A. (2001). "Evolution of Manufacturing Planning and Control Systems: From Reorder Point to Enterprise Resource Planning." *Production and Inventory Management Journal*, 42(2), 1-7.

xxxix. Rose, J., Jones, M. and Truex, D. (2005). "Socio-Theoretic Accounts of IS: The Problem of Agency." *Scandinavian Journal of Information Systems*, 17(1), 133-152.

xl. Shields, M.G. (2001). *E-business and ERP: Rapid Implementation and Project Planning.* New York: John Wiley & Sons, Inc.

xli. Stratman, J.K. and Roth, A.V. (2002). "Enterprise Resource Planning (ERP) Competence Constructs: Two-Stage Multi-Item Scale Development and Validation." *Decision Sciences*, 33(4), 601-628.

xlii. Swamidass, P. and Kotha, S. (1998). "Explaining manufacturing technology use, firm size and performance using a multidimensional view of technology." *Journal of Operations Management* 17(1), 23-35.

xliii. Tarafdar, M., & Roy, R.K. (2003). "Analyzing the adoption of enterprise resource planning systems in Indian organizations: A process framework." *Journal of Global Information Technology Management*, 6(1), 31-51.

xliv. Vijaybaskar, M. (2005). "ICTs and Transformation of Traditional Workplaces: The Case of the Automobile Industry in India," in *ICTs and Indian Economic Development: Economy, Work, Regulation*, A. Saith and M. Vijayabaskar (eds.), CA: Sage Publications.

xlv. Wang, C., Xu, L., Liu, X. and Qin, X. (2005). "ERP research, development and implementation in China: An overview." *International Journal of Production Research*, 43(18), 3915-3932.

xlvi. White, R.E., Pearson, J.N. and Wilson, J.R. (1999). "JIT Manufacturing: A Survey of Implementations in Small and Large US Manufacturers." *Management Science*, 45(1), 1-15.

xlvii. Yasai-Ardekani, M. (1989). "Effects of environmental scarcity and munificence on the relationship context to organizational structure." *Academy of Management Journal*, 32(1), 131-156.

Impact Of IT On Indian Commercial Banking Industry: DEA Analysis

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ABSTRACT

In recent time, Indian banking industry has been consistently working towards the development of technological changes and its usage in the banking operations for the improvement of their efficiency. To get the benefits of enhanced technologies, Indian banks are continuously encouraging the investment in information technology (IT), i.e. ATMs, e-banking or net-banking, mobile and tele-banking, CRM, computerisation in the banks, increasing use of plastic money, establishment of call centers, etc. RBI has also adopted IT in endorsing the payment system's functionality and modernization on an ongoing basis by the development of Electronic Clearing Services (ECS), Electronic Funds Transfer (EFT), Indian Financial Network (INFINET), a Real-Time Gross Settlement (RTGS) System, Centralized Funds Management System (CFMS), Negotiated Dealing System (NDS), Electronic Payment Systems with the 'Vision Document', the Structured Financial Messaging System (SFMS) and India Card – a domestic card initiative, implemented recently (2011). Therefore, Indian banking environment has become more compatible as compare to the standards of international financial system, by the positive impact of all these efforts. This study makes an attempt to map the impact of IT on banking sector for scheduled commercial banks operating in India including public, private and foreign sector banks in India. The study uses a non-parametric linear programming based technique. The results convey that all SCBs have shown a significant and improving trend in their performance due to the adoption of IT. This adoption is required mandatory to take the country into the 21st century.

KEYWORDS

DEA Model	Information Technology (IT)
Indian Banking Environment	Information and Communication Technology (ICT)

Preamble

Indian banking industry has witnessed a remarkable development in the Informational Technology (IT) in last few years. Banking transactions are become easier and customer friendly due to the technological improvements. To play a supportive and key role, banks are providing with lots of services which are the combination of electronics and information technology, like, *Automatic Teller Machines (ATMs*, *plastic money* i.e. credit card, debit card and smart cards, *phone banking, e-banking* which is called by *net-banking*, etc. ATMs have emerged as the most favoured channel for offering banking services to the customers in the world (Mittal & Dhingra, 2007). RBI has also adopted IT in endorsing the payment system's functionality and modernization on an ongoing basis to improve the efficiency of banking sector. There is a noticeable improvement in the performance of financial institutions and the service sector by incorporating IT into their functionality. It shows an increasing share, enhanced competitiveness at the global surface because of adopting IT culture (Vittaldas Leeladhar). The advancements in information and telecommunication technologies (IT) since past 25 years clearly indicate a positive impact on banking and financial institutions (Rishi & Saxena, 2004).

Before the technological innovation, the functioning of all banks was manual for all the services including data handling, maintaining and processing the accounts, receiving the customers and fulfillment their needs etc. Customers had to pay their time, patience in banks to do their transactions completely. They had to face the multiple occurrences of unnecessary requirements within limited time period and to suffer by the lack of proper information to complete their financial desires. Attendants were limited compared to the customers; hence, were not capable of attending them efficiently and effectively within the given time framework. As a result of this growing dissatisfaction amongst the customers there was an imperative need to automate this sector so as to remove all these problems. In 1980's, the developments in IT with the advancement in personal computer (pc) and emerging networking made the transactions automatic by computerisation in the banks. Now, customers could use error free services due to development of information and communication technology (ICT). With this automation customer retention ratio went up as customers were very satisfied with the modernization of the set up. The ICT, structural and functional changes were introduced in mode of banking transactions to electronic channels not only in urban areas but also in rural and NCR. This changed their strategic behaviour and enhanced their scale of operations. Indian Banking Sector witnessed new opportunities and challenges as there was a major drift in the present paradigm .IT improvements are significantly useful to reduce the cost and improve the efficiency of the banks. Technological efficiency can result in lower transaction costs and increased revenues for banks (Rishi and Saxena, 2004). Transactions through technology channels cost much less to the banks than the customers reaching the bank and doing the transaction. Relative Cost of banking transactions using various channels of IT are shown in Table1.

Table 1: Relative cost of banking transaction through different modes

Channel	Cost per transaction (Rs.)
Physical Branch	100
Postal	40
Telephone	18
ATMs	18
Internet	12

*Source: Bank of International Settlements

It is evident that information technology has brought key changes in the banking operations. Foreign and Private foreign sector banks were the leaders in adopting the new the technology to align their business processes and were successful in creating the synergies between the two. In case of public sector banks which had already had the massive physical infrastructure and to make these banks IT enabled Business Process Re-engineering (BPR) was required. Technology deployment is slow in these banks because of this reason. The main focus of the banks till now was on the deploying the technology. The main challenge now onwards for all the banks will be to make the customers use of the technology and reduce down the transactions cost. This study focuses on the technological challenges that banks needs to address, failing in which, they are likely to loose the market share in the times to come. Being focused on the aspect of IT, there is a requirement to analyse the impact of IT and other technological changes on the efficiency of Indian

commercial banks. This study will use DEA approach with two CCR & BCC input-oriented models i.e. minimization of inputs with the constant level of outputs and output-oriented model i.e. maximization of output with a constant level of input, to examine the impact. DEA approach is a non-parametric linear approach which is more useful in designing micro-level policies in the Indian banking industry. The analysis is based on the data of all SCBs of India for recent time period of five years from 2005-06 to 2009-10.

The evidence refers improved discrete efficiency level in all the groups but the leader is FBs as compare to PrSBs and PSBs respectively operating in India over the study concerned (2006-2010). The major objective of the study is to evaluate the improvement in overall as well as group-wise performance of all the scheduled commercial banks operating in India by measuring and comparing the efficiency scores of each group respectively. The results clearly exhibit a significant improvement in efficiency after the adoption of IT in Indian banking industry but also witnessed an increment in the scores of individual bank-group also. The analysis recommends that such increment would be driven due to *the technological improvement*, which spreads the range of production possibilities, with the financial innovation and emerging new strategies pursued by banks suited to their performance (Mohan 2005).

The paper is classified into following six sections as *Section 1:* presents a brief Introduction about IT introduction and its impact, *Section 2:* gives extensive Review of Literature. *Section 3:* conveys about the Conceptual Framework and Research Objectives, *Section 4:* gives elaboration on Data Collection and Methodology. *Section 5:* entails the Interpretation of Empirical Results and *Section 6:* exhibits the Conclusions of the study.

REVIEW OF LITERATURE

Negative relationship in profitability and introduction of IT

Many research studies have been done on the topic of IT investment and its impact on productivity and profitability of banks. Some studies have used *correlation* to find the impact of IT expenditure on the performance (Dos Santos et al. 1993). The analysis exhibits that IT spending is unproductive due to an insignificant correlation between IT spending and profitability measurers. These findings do not account for the economic theory of equilibrium that increment in IT spending doesn't imply improved profitability of banks (Brynjolfsson & Hitt 1996). They used *Cobb-Douglas production function* to assess the investment on computerisation at firm level. The research observed 81% increases in output due to computer related capital investment whereas only 6% increment in marginal output due to non-IT capital. A study is prepared by Morrison and Bernlt (1990) on manufacturing industry at industry level. The study observed that because of over investment in IT, estimated *marginal profits are less than the marginal cost and the increase in output* is only 80 cents for one dollar spends on IT. Another researcher also found the same insignificant contribution of IT expenditure to the output (Loveman, 1994). Similarly, Prasad & Harker (1997) conducted a study on US retail banking sector to assess the effect of IT. They also get the same conclusion as no real benefits of additional investment in IT within the competition.

Positive relationship in profitability and introduction of IT

In contradiction of above, following studies conclude that there are considerable increase in profitability from the enhanced investment in IT and IT innovations. Lichtenberg (1995), used the same Cobb-Douglas production function like Brynjolfsson & Hitt (1996), but the results are different. Lichtenberg (1995) exhibited that investment in computers is resulted as increased returns with the high marginal productivity. Basle Committee (1998) and Healy & Palepu (2001) are also agree in this statement. They suggest that the use of technology can improve/enhance systems for administrative control such as enabling better management of risk, which if disclosed in regulatory reports to supervisors and in annual reports to investors, can improve bank transparency and enable the banks to reduce their cost of capital. Hence, technology can be the key to differentiation, competitive edge, and institutional survival. The first wave of technology adoption was literally a move to computerize operations by PSBs to increase efficiency in retail banking operations. 3 Banks rapidly installed Automatic Ledger Posting Machines (ALPMs) and mini computers, and began an aggressive program of training programmers and data entry terminal

operators. The Rangarajan Committee (1989) provided further impetus to technology adoption by recommending full computerisation of both front and back office operations of large branches. Thus, the thrust of technology in its early phases was on branch automation, i.e., total automation of a bank with its own data base.

Innovations in information technology and development in IT sector has been enforced the convention of IT elements in maximum branch of banks. Public sector banks were late adopter of new technology as compare to private and foreign banks (Rishi & Saxena, 2004). Some studies present the impact of IT on one bank-group. Well-capitalized new banks have improved their services, management, and prudential supervisory capacity and as a result the efficiency of banks (Walter & Gray 1983; Gelb & Sagari 1990). The entry of foreign banks tends to lower interest margins, profitability, and the overall expenses of domestic banks (Claessens et. al. 2000; Levine 1996). Clarke et al. (2000), found the impact of foreign entry on domestic banking sector of Argentina. Some are based on PSBs only (Mittal & Dhingra, 2007). They measured impact of IT on profitability and productivity of PSBs. On the aspect of IT, the recent study is completed by Debaprosarma Nandy (2010). He analysed the development of IT (information technology) in Indian banks. The result presented an improved trend among IT and the performance of Indian banks.

In the presence of these studies, we can say that there are most of the studies focused at firm level or have a single aspect of IT i.e. computer (Parsons, Gotieb & Denny, 1993). The study used translog production function for five Canadian banks. The conclusion showed a 17-23% increase in productivity by using computers, the returns were very modest compared to the levels of IT investments. Another study, which has key importance in this regard, is undertaken by offsite monitoring and surveillance division of department of Banking Supervision (2002). This study used computerization (financial indicator) as one of the factor in improvement of the efficiency. The result exhibited the fact that superior performance can have without rising in the number of staff and also possible to improve their productivity and efficiency over a period of time. Lunardi, Becker & Macada (2003), found high competition as variable affecting IT. As the time changed, it can be positive for the performance of banks, if banks will accept the competition in this new electronic era with managed strategies.

Many studies used DEA model to evaluate the efficiency of banking sector. Das et al., (2000) used DEA approach for all the three types of ownership—public, private and foreign. Kamakura & Ratchford, (1996) used DEA with translog cost function to measure efficiency of multiple retail stores. By using DEA, there are different views for input measurement. Some have taken computer as input measure (Oral and Yolalan, 1990; Vassiloglon & Giokas, 1990) whereas some others choose time (Zenios et al., 1999). Choudhari & Tripathy, (2004) used DEA for many parameters to assess the relative performance of PSBs .The study had following parameters, profitability, financial management, growth, productivity, and liquidity. Another user of this approach were Mukherjee *et al.* 2002; Kumar & Verma 2003; Sathye 2003; Gunjan M.Sanjeev; 2006; Gupta et al., 2008; Rezvanian *et al.*, 2008; Awdeh & Moussawi, 2009; Sunil & Rachita, 2010 etc. Some studies used different approach like stochastic frontier approach or regression model. Shirai (2001), used least square regression model to assess the governance of Indian banking system. Shanmugam & Das, (2004), used stochastic frontier approach to measure efficiency of banks groups. Sensarma, (2005 & 2008) used the same to analyse the performance of Indian banks.

After the extensive review of literature to observe the impact of IT on efficiency of Indian Banks, it is evident that there is no one comprehensive study available which throw light on all SCBs as well as individual bank groups, also the parameters the earlier studies have taken are also not exhaustive and complete. Present Paper is an attempt in this direction and will try to bridge the gap, taking the major parameters which could impact the efficiency and profitability of commercial banks and will also analyse the impact of IT on all SCBs as well as individual bank groups.

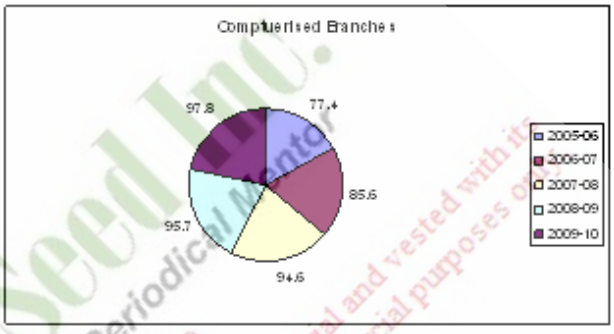
CONCEPTUAL FRAMEWORK

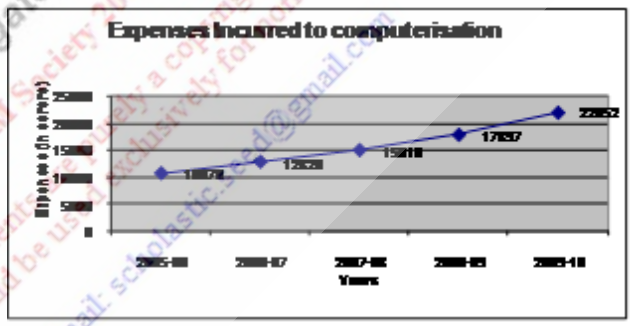
Technology Trends in Indian Banking Sector

Information and Communication Technology (ICT) has changed the working of banks and other financial institutions world wide. The major breakthrough started with use of *Advanced Ledger Posting Machines (ALPM)* in 1980s. The massive automation at branch level reduced errors in calculations and transactions and resulted in Customers getting error free service and was supplied with printed account statements. In late 1980s banks *total bank automation (TBA)* which means total automation of a particular branch with its own database, was introduced both the front-end and back-end operations within the same branch. In the sequence of mechanization steps initiated by the Indian banking sector Mechanized cheque processing systems have been established which used the *Magnetic Ink Character Recognition (MICR) technology.* After the financial sector reforms i.e. entry of new private sector banks and with the introduction of internet, banks opted for single centralized databases instead of having multiple databases for all their branches which resulted in low cost vis-a vis Decentralized networks. After the entry of private and foreign banks in 1996, public sector banks (PSBs) under the pressure of competition, have adopted several initiatives and technology is one of them. Some of the proactive PSBs have been striving hard to make their structures flexible enough to accommodate technological changes. Technology has put pressure on PSBs to restrict the branch network and employ a better skilled workforce. Technological revolution has strongly impacted strategic business considerations for Indian banks by cutting down costs of delivery and transaction massively. In India, presently there is clearly a digital divide – one who is multi-channel user and other who still relies on the branch as main channel. The challenge for the banks is to keep the customers happy irrespective of the kind of channel they use. New private sector banks and foreign banks employed ATMs, phone banking and internet banking from the day one. With no choice in the hand, public sector banks followed the suite; their ongoing and future investments are massive in the technology. Total expenditure incurred on computerization and development of communication networks by PSBs as on March 31, 2005 was 9487.37 crore (RBI reports 2005-06). On going status of computerization and expenses in PSBs is summarized in Table 2.

Table 2: Computerisation in Public Sector Banks

Years	Branches Fully Computerized	% of Partial Computerized	Expense Incurred
2005-06	77.4	18.2	10676
2006-07	85.6	12.4	12826
2007-08	94.6	5.4	15016
2008-09	95.7	4.3	17897
2009-10	97.8	2.2	22052





Introduction of IT shifted the whole paradigm in the working of banks where banks can create their own web pages, and customers of the banks can access these web pages through the web browsers by sitting at their homes. This kicked off online banking way back in 1996, while usage increased only after 1999 due to lower ISP online charges, increased PC penetration and technology stabilization. Customers enjoyed anytime anywhere banking as a consequent of Internet and could get their account information, bills could be paid online through the electronic bill payment service, online requests i.e. stop payment

of cheque , cheque book replenishment, demand draft, opening of fixed deposit account (Shroff, 2004) etc. could also be made.

The other significant developments include the evolution of the *ATM* channel, debit cards, mobile banking, and tele-banking through which the banking facilities are available to customers on a 24/7 basis across the world. Establishment of the *INFINET* in 1999 resulted in introduction of *Real Time Gross Settlement (RTGS) system* Internet has thus ushered the concept of any time and any where banking. It resulted in compliance with the core principles for systemically important payment systems of the Bank of International settlements (BIS), and has also provided the way for risk free, credit push-based fund transfers settled on a real time basis (Institute for Development and Research in Banking Technology, IDRBT, 2010). RTGS is available today across more than 23,700 branches of banks spanning more than 500 centers in the country for inter-bank funds settlement (Reddy, 2006).

Another paradigm shift is *Data warehousing* which is very vital in providing strategic information. Strategic information is required by the management information for continued health and survival of the bank. This information is not required for running the day-to-day operations of the business but for taking key and strategic decisions like where to open a new branch, which product lines to expand and which market is to strengthen. Data warehousing is the complete solution for providing *strategic information* not only this it makes available total view of the bank, makes the bank's current and historical information easily available for decision making, makes decision-support transactions possible without hindering operational systems (Paulraj, 2001). The story doesn't end here by automating the setup another challenge before bank is data mining i.e. discovering knowledge from the data warehouse. It is all about *knowledge discovery process* that reveals the patterns and trends in the data and helps in predicting future by the user also. *Data mining* can answer the query i.e. which customers are likely to be bad credit risks? Which branch will perform the best for coming two years? Which customers offer the best profit potential? Which customers are likely to switch to competition next year? Many banks have started paying greater attention to retain customers and wining new ones because of enhanced competition. Customer focus has become the catchphrase and need have today and is taken to be a winning strategy and have adopted *customer relationship management (CRM) systems* to achieve the same. Banks are using Data mining also to provide vital information about the customer for better relationship management. Banks are setting *Knowledge Management System (KMS)* using ICT as they are lifeblood for banks in mitigating and managing risks. A good KMS must store all the knowledge in a knowledge repository, sometimes called a knowledge warehouse. It is a systematic process for capturing, integrating, organizing, and communicating knowledge accumulated by the banks which makes them more productive and efficient. As a part of the KMS banks have set up their own intranets and extranets, which are boon to both employees and customers, spread over wide geographic locations.

The year 2006-07 witnessed the commencement of consolidation of IT based efforts by the financial sector in general and by the commercial banks in particular. The major developments during the year included the setting up of the data centers, migration towards centralized systems and large scale implementation of core banking systems across bank branches. To enable banks to plan their IT road maps and ensure best results, the *Reserve Bank had published the Financial Sector (FST) Vision in 2005.* This document was reviewed in the context of IT developments and the draft document for the medium-term has been placed for public comments before it is finalized. The Mission Statement as 'IT for Efficiency and Excellence' and the corporate objective of 'enabling financial sector to leverage on IT for better customer service, improved housekeeping and overall systemic efficiency' continue to be the guiding principles of the FST Vision. Multi-application smart cards, which are heralding a new vista in banking, have made their presence felt as part of initiatives aimed at financial inclusion in parts of the North-East and the Southern regions. A smart card is a card which is similar to a credit/debit ATM card. The distinguishing feature lines in the presence of a chip in the card which can store information. Unlike in the case of magnetic-stripe based cards, the stored information in the chip could either be permanent in nature, or may be subject to change. For instance, the passwords can be changed at any frequency by the cardholder. Because of its additional feature, smart cards find usage not only for financial transaction processing but in a number of other areas as well. One of the greatest advantages of the smart card technology is its ability to consolidate multiple applications in a single, dynamic card. These cards

simplify life for end-users, often replacing up to three other cards for payment and other transactions. Thus, there can be a single card which can function as an identity card, as a driving licence, as a health card and also for other funds related purposes. Because these cards deliver such highly personalized applications, their perceived value among end-users is much higher and helps to build stronger than average customer loyalty. With Indian banking having embraced IT in a large way, the potential for usage of multi-application smart cards is high. Smart-card-based electronic purse systems, in which value is stored on the card chip and not in an externally recorded account so that machines accepting the card need no network connectivity.

Indian banking sector is left with no choice but to invest large funds to achieve this, considering the benefits. There are some empirical studies done which conform to this for e.g. in a survey conducted by McKinsey Consultancy (2002), it has been observed that there exists a large productivity gap between Indian banks and the US banks. This gap is found to be, to the extent of 90% in public sector banks, 68% in private sector banks including foreign banks. This study suggests that the banks should make more investment in information technology. However, for any further investment it becomes imperative to assess the impact of existing investment in terms of gains in banks' profitability and efficiency. Here study of all SCBs becomes all the more relevant as their ongoing and future investments are massive in technology. Although many studies have been conducted to investigate this effect, the results are not conclusive in supporting a systematic effect due to shortcomings in these studies. These shortcomings include; measurement errors, lags between investment and benefits, redistribution of profits and mismanagement of IT resources. The present study attempts to find the impact of information technology investments on the profitability and efficiency of all SCBs using Data Envelopment Analysis (DEA).

RESEARCH OBJECTIVES

Indian banking sector had to face many challenges as regards IT incorporation in the culture, like significant supply shocks of IT, user friendly technology and expansion of branches accordingly, reduction in cost, fully computerized system and risk bearing capability due to the enhanced technology etc. Indian banking industry is required to acceleration growth, reduce the rate of inflation and maintain the financial stability (Mohan, 2005). To fulfill these requirements, the present status of Indian banking industry, importance of IT and the significant changes in performance of banks due to IT has to be properly vouched.

The *objectives* of this paper are as follows

- To asses the efficiency and profitability of Indian commercial banks.
- To analysis the role of Information Technology and its relevancy in Indian banks in the recent era.
- To measure the performance of the each bank group towards the elements of IT.

Following are the testable hypothesis:

Hypothesis 1: There is increase in profitability of Indian Commercial Banks in the study period (2005-06 to 2009-10).

Hypothesis 2: There is an increase in efficiency in the SCBs after the advent of IT.

Hypothesis 3: IT influx has resulted in higher efficiency level of each bank group.

METHODOLOGY

Data Collection

The study has measured the efficiency level of all the scheduled commercial banks (SCBs) operating in India during the study period of five years (2006-2010). In the year 2009-10, there are 28 Public banks, 22 Private banks and 27 Foreign banks under the heading of SCBs of India (RBI reports and publications, 2010). Therefore, the study has the data of 86 banks (some were absent from the study) for the study period. Data for few banks could not be included either they were closed down or merged with some other bank during the study period. The focus of the paper is to evaluate the efficiency scores and relative productivity as regards IT related factors using DEA analysis. There are two important aspects of DEA, following which it is preferable to study the population of banks. Firstly, it is *sample specific*, thus implying that results obtained for the sample cannot be generalized for the entire population. Secondly, it gives the *relative* efficiency scores and not the *absolute* efficiency scores. This means that the best performing DMU out of the

group will be shown as 100 per cent efficient. The rest of the DMUs will be benchmarked against this one. In case of DEA, the sample size should be generally larger than the product of the number of inputs and outputs (Dyson *et al.* 1998). Thus in this study, the sample size of 86 is sufficiently large to take care of the constraints imposed by the requirement of the DEA model. The data used in this study is financial information available in the Annual reports of the banks and RBI publications.

Data Envelopment Analysis

Charnes, Cooper & Rhodes (1978) first proposed DEA as an evaluation tool to measure and compare DMU productivity. After that this tool was extensively used in banking and other areas to measure the DMU relative productivity. Examples include the maintenance activities of U.S. Air Force bases in different geographic locations, or police forces in England and Wales as well as performances of branch banks in Cyprus and Canada and the efficiency of universities in performing their education and research functions in U.S., England and France. These kinds of application extend to evaluating the performance of cities, regions and countries with many different kinds of inputs and outputs that include "social" and "safety-net" expenditure as inputs and various "quality-of-life" dimensions as outputs (Cooper *et al.,* 2000). Data Envelopment Analysis is an approach of comparing the efficiency of organizational units such as bank branches, schools, hospitals and other similar instances where there is a relatively homogenous set of units. The analysis will measure output(s) achieved from the input(s) provided and will compare the group of DMUs by their strength in turning input into output. At the end of analysis the DEA will be able to say which units are (relatively) efficient and which are (relatively) inefficient.

The Data Envelopment Analysis is a method for mathematically comparing different decision-making units' (DMUs) productivity based on multiple inputs and outputs. The ratio of weighted inputs and outputs produces a single measure of productivity called relative efficiency. DMUs that have a ratio of 1 are referred to as efficient, given the required inputs and produced outputs. The units that have a ratio less then 1 are less-efficient relative to the more efficient unit(s). Because the weights for input and output variables of DMU are computed to maximize the ratio and then compare to similar ratios of best performing DMUs, the measured productivity is also referred to as relative efficiency.

APPROACHES OF PERFORMANCE MEASUREMENTS

There are various parametric and non-parametric approaches to measure performance. Performance ratios are widely used in all sectors of business. The best known ratios are for financial and production managers. The financial ratios regarding liquidity, capital adequacy, earnings and liability are widely used measures of organizational performance. However, they have one disadvantage. Each single ratio must be compared with some benchmark ratio one at a time. While the calculation of a set of financial ratios is relatively easy, the aggregation of those ratios can be quite complicated-involving experienced judgment. Financial ratios do provide information on the overall financial performance of an organization, but provide little information about the amount by which performance could be improved or the area where the effort should be focused in order to improve performance. On the other hand DEA method not only finds the efficient DMUs but also tells how to make other inefficient DMUs efficient by varying in the input and output parameters by suggested amount.

The regression models are quantitatively robust, they lack the ability to include multiple inputs and outputs because regression models usually restrict the analysis to one dependent variable. Regression models also provide only an estimate of model success, while offering no feedback about improvement possibilities. Additionally, regression models impose a particular functional form on the data, producing a single function that represents a set of hypothetical "average" performers. DEA, on the other hand, produces an efficient frontier consisting of the set of most efficient performers, allowing a direct comparison to the best performers as opposed to average. The difference between regression and DEA is illustrated in figure (Donthu et al., 2005).

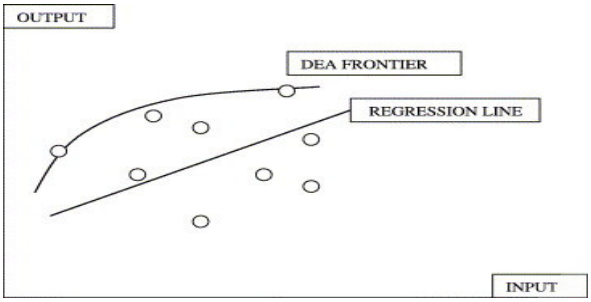


Fig 3: Regression versus DEA

While the regression produces an "average" line across all DMUs, DEA produces an efficient frontier that encompasses the best performers. While DMUs above the regression line appear to be performing better then the average, they are not performing as well as the best performers or most productive DMUs on the efficient frontier.

DEA Model

One of the basic choices in selecting a DEA model is whether to use an input-orientation or an output-orientation. The difference is subtle but important and can typically be best understood by considering whether a DMU emphasizes on reducing input while achieving the same level of output or emphasizes on producing more output given the same level of input.

DEA offers three possible orientations in efficiency analysis (Charnes *et al.* 1994):

(a) Input–Oriented models are models where DMUs are deemed to produce a given amount of output with the smallest possible amount of input.
(b) Output-Oriented models are models where DMUs are deemed to produce the highest possible amount of output with the given amount of input.
(c) Base-Oriented models are models where DMUs are deemed to produce the optimal mix of input and output.

RETURN TO SCALE

Return to scale refers to increasing or decreasing efficiency based on size. For example, a manufacturer can achieve certain economies of scale by producing thousand Integrated Circuits at a time rather than one at a time. It might be only 100 times as hard as producing one at a time. This is an example of increasing returns to scale (IRS). On the other hand, the manufacturer might find it more than trillion times difficult to produce a trillion Integrated Circuits at a time because of storage problems and limitations on the worldwide Silicon supply. This range of production illustrates Decreasing Returns to Scale (DRS). Combining the extreme two ranges would necessitate Variable Returns to Scale (VRS). Constant Return to Scale (CRS) means that the producers are able to linearly scale the inputs and outputs without increasing or decreasing efficiency. This is a significant assumption. The assumption of CRS may be valid over limited ranges but its use must be justified. But, CRS efficiency scores will never be higher than that of VRS efficiency scores. In a CRS model, the input-oriented efficiency score is exactly equal to the inverse of the output-oriented efficiency score. This is not necessarily true for inefficient DMUs in the case of other return to scale assumptions. The CRS version is more restrictive than the VRS and yields usually a fewer number of efficient units and also lower efficient score among all DMUs. In DEA literature the CRS model is typically referred to as the CCR model after the originators of the seminal publication, by Charnes, Cooper and Rhodes (1978).

THE CCR MODEL OF DEA APPROACH

DEA is a linear programming based technique for measuring relative performance of DMUs. CCR Model, which was initially proposed by a Charnes, Cooper and Rhodes, can be represented as a fractional linear programming problem:

$$E_o = \frac{u_1 y_{1o} + u_2 y_{2o} + \ldots\ldots + u_s y_{so}}{v_1 x_{1o} + v_2 x_{2o} + \ldots\ldots\ldots + v_m x_{mo}}$$

subject to, $\frac{u_1 y_{1j} + u_2 y_{2j} + \ldots\ldots + u_s y_{sj}}{v_1 x_{1j} + v_2 x_{2j} + \ldots\ldots\ldots + v_m x_{mj}} \leq 1 \quad (j=1, \ldots, n)$

$v_1, v_2, \ldots\ldots, v_m \geq 0$ and $u_1, u_2, \ldots\ldots, u_s \geq 0$

where, Eo= the efficiency of the o^{th} DMU,

Y_{so} = s^{th} output of o^{th} DMU,

U_s = weight of s^{th} output

X_{mo} = m^{th} input of the o^{th} DMU

V_m = weight of m^{th} input

Here, the DMU_j to be evaluated on any trial be designed as DMU_o where o ranges over 1,2,…,n. The constraints meant that the ratio of "virtual output" vs "virtual input" should not exceed 1 for every DMU. The above fractional program can be replaced by the following linear program:

Maximize, $Eo = u_1y_{1o} + v_2y_{2o} +....+u_sy_{so}$

Subject to, $v_1x_{1o} + v_2x_{2o} +....+v_mx_{mo} =1$

$U_1y_{1i} +u_sy_{si} \leq v_1x_{1i} + v_2x_{2i} +....+v_mx_{mj}$ (j = 1,....,n)

$V_1,v_2,....v_m \geq 0$

$u_1,u_2,....u_m \geq 0$

The DEA model is a fractional linear program but may be converted into linear form in a straight forward manner so that the methods of linear programming can be applied. The fractional program can converted to linear program by normalizing either the numerator or the denominator of the fractional program objective function. The weighted sum of the inputs is constrained to be unity in the linear program. As the objective function is the weighted sum of outputs that has to be maximized, this formulation is referred to as the output maximization DEA program. The *key feature* of above model is weights are treated as unknown. They can be obtained by solving the fractional programming problem to obtain values for the input weights (v_i) (i=1,...,m) and the output weights (u_r)(r=1,....,s) as variables. The value obtained of these weights will maximize the efficiency of the o^{th} target units.

The BCC Model of DEA Approach

The output-oriented BCC model can be written as

Max ηB

Subject to $X\lambda \leq x_o$

$\eta By_o - Y\lambda \leq 0$

$e\lambda = 1$

$\lambda \geq 0$

This is the envelopment form of the output-oriented BCC model.

EMPIRICAL RESULTS

***Hypothesis 1*:** There is increase in profitability of Indian Commercial Banks in the study period (2005-06 to 2009-10).

The relation of IT Investments and Indian commercial banking sector is significant. The paper is used following profitability indicators to measure the relationship, Net Profit (NP), Business Per Employee (BPE) and Profit Per Employee (PPE). All these factors are showing in following table 3 with clear picture through related figures.

All the banks are showing an increasing trend in NP during the study period see (Table 3.1). Each banks-group has an upward trail with satisfying growth due to innovation of IT; overall all SCBs have showed high NP. These results are consistent with findings of another study considering a temporal trend carried out by Bhattacharyya *et al.* (1997) who reported that the overall average performance increased after 1987 for the study period 1986-91.

Table 3: Profitability Indicators for Indian Scheduled Commercial Banks

Table 3.1: Net Profit (in lakh Rs.) as 1st Parameter

Years/Groups	PSBs	PrSBs	FBs	SCBs
2005-06	16539	4905	3096	24593
2006-07	20152	6485	4585	31202
2007-08	26592	9522	6612	42726
2008-09	34394	10868	7510	52772
2009-10	37428	11435	8214	57077

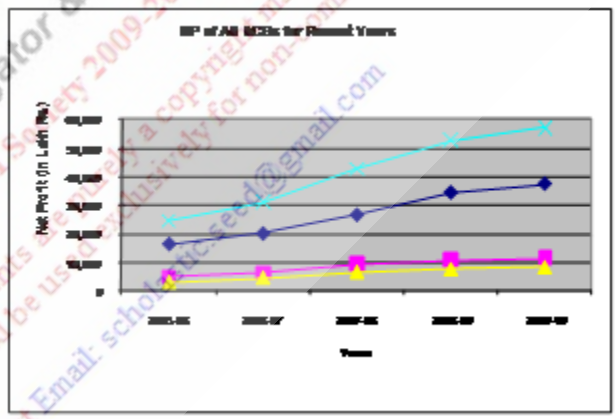


Fig 4: Increased Net Profit of all banks groups in Post-Advent of IT

Enhanced IT in banking sector has effected positively on each bank group as according to BPE the profitability indicator (Table 3.2). The highest growth is acquired by PSBs from 366.61 (2005-06) to 870.29 (2009-10) i.e. 137% increase in profitability, following by FBs with 51% and PrSBs with 19% respectively. SCBs as a group also showed a noticeable growth from 419.80 in 2005-06 to 873.32 in 2009-10 i.e. 108 %.

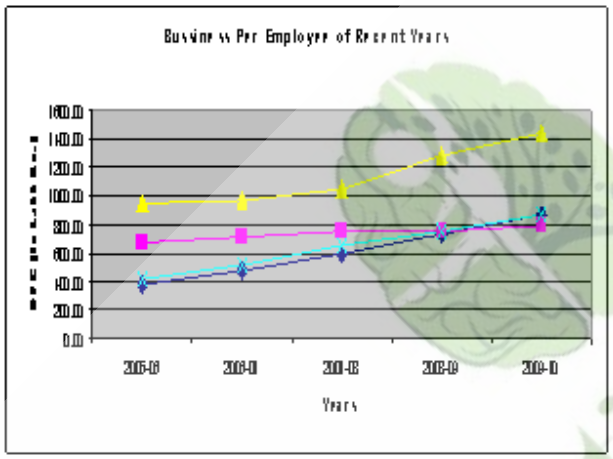


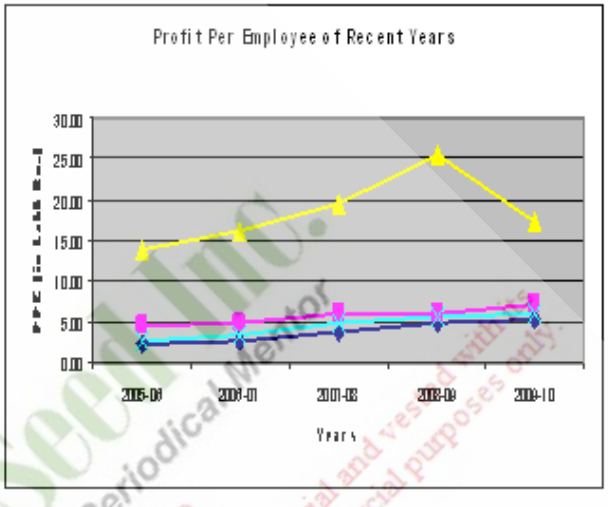
Table 3.2: BPE (in lakh Rs.) as 2nd Parameter

Years/Groups	PSBs	PrSBs	FBs	SCBs
2005-06	366.61	670.94	955.41	419.80
2006-07	471.18	704.19	974.77	522.94
2007-08	600.00	751.42	1037.10	643.24
2008-09	734.35	743.85	1282.74	753.44
2009-10	870.29	798.37	1445.87	873.32

There is an increasing trend because of IT innovations as is reflected in profit per employee (PPE) also. Again top in the ladder is PSBs following by PrSBs then FBs, while the highest value of PPE is showing by FBs (17.09), then PrSBs (7.19) and lowest by PSBs (5.34) respectively. The evidence presents overall growing rate in the values of SCBs as a group i.e. 116%, see table 3.3 with related fig.

Table 3.3: PPE (in lakh Rs.) as 3rd Parameter

Years/Groups	PSBs	PrSBs	FBs	SCBs
2005-06	2.22	4.50	13.87	2.80
2006-07	2.76	4.71	16.13	3.49
2007-08	3.75	6.00	19.47	4.74
2008-09	4.70	6.16	25.39	5.63
2009-10	5.34	7.19	17.09	6.05



Hence from the analysis it is evident that all SCBs have shown a significant and improving trend in their performance due to the adoption of IT, which leads to acceptance of our hypothesis. Indian banking industry is likely to witness greater propel in this field in coming years with extensive use of IT in their operations.

Hypothesis 2: There is an increase in efficiency in the SCBs after the advent of IT.

The high efficiency scores are taken as a parameter to show an increasing trend of Indian commercial banking industry. The year-wise DEA scores of SCBs operating in India for efficiency measures are summarized in table 4. It clearly shows a consistent mounting trend in the efficiency scores of all SCBs operating in India. For this analysis 4 inputs and 5 outputs are used which are considered the efficiency measures. ***Input items*** are: Operating Expenses (OE), Staff Expenses to Operating Expenses (SE to OE), and percentage of offsite ATMs to Branches (% of offsite ATMs to Bs) and Expenses incurred on ATMs (Exp. on ATMs). ***Output items*** are: Business Per Employee (BPE), Total Income per Branch (TI

per Branch), Net Profit to Deposits (NP to Deposits) and Return on Assets (ROA as %).

SCHEDULED COMMERCIAL BANKS (SCBS) (AS GROUP)

In the analysis the DMUs i.e. SCBs which score 1, this rating is considered to be efficient and others considered to be relatively inefficient. Results on efficiency measures by the CCR models (CCR-I and CCR-O) show that SCBs (as a group) are fully efficient in year 2008-09 and 2009-10 while from 2006 to 2008 they had relatively less efficiency. On the other hand, BCC models (BCC-I and BCC-O) find that SCBs are efficiently working in all the years. The efficiency measurement indicates that scheduled commercial banks of Indian banking sector have the proper balance with IT innovations and upgrade electronic systems in banking operations. It is growing in a continuous upward trail in their performance and efficiency level with the passing time.

Table 4: DEA Efficiency Scores of SCBs of India

Years/Model	CCR-I	BCC-I	CCR-O	BCC-O
2005-06	0.942	1	0.942	1
2006-07	0.904	1	0.904	1
2007-08	0.946	1	0.946	1
2008-09	1	1	1	1
2009-10	1	1	1	1

The hypothesis is accepted as the efficiency measures clearly indicate that SCBs of Indian banking sector have the proper balance with IT innovations and upgrade electronic systems in banking operations. It is growing in a continuous upward trail in their performance and efficiency level with the passing time.

Hypothesis 3: IT influx has resulted in higher efficiency level of each bank group.

Group-wise Analysis

In this section we have examined the impact of IT influx individually on each bank group. DEA efficiency scores of each bank group is shown in following tables , public sector banks efficiency scores in exhibited in table 5, private sector bank efficiency scores in table 6 and foreign banks efficiency scores in table 7 respectively.

PUBLIC SECTOR BANKS

The result shows a fluctuating trend in efficiency scores of public sector banks operating in India. As per CCR models, PSBs are working efficiently in year 2005-06, 2006-07 as the score is 1 which means 100% efficiency and then faced a slight decline till 0.948 in year 2007-08. In next year 2008-09 it increase up to 1 then at last it again fall down at 0.951 in the last year of the study 2009-10. According to BCC models, PSBs are running as fully efficient units in every year with the exception of year 2007-08 (table 5).

Table 5: DEA Efficiency Scores of PSBs of India

Years/Model	CCR-I	BCC-I	CCR-O	BCC-O
2005-06	1	1	1	1
2006-07	1	1	1	1
2007-08	0.948	0.983	0.948	0.983
2008-09	1	1	1	1
2009-10	0.951	1	0.951	1

The explanation suggests that public sector banks made a heavy investment to be IT enabled but still it has to be more concentrated on cost reduction. Business process reengineering and better coordination in different activities and new systems is required to achieve high efficiency in recent competitive environment. Considering the scores analysis aftermath, our hypothesis is accepted i.e. there is increase in efficiency of PSBs operating in India during 2006-10 because of influx of IT.

PRIVATE SECTOR BANKS

The efficiency scores of private sector banks clearly show an increasing trend in the efficiency scores after the advent of IT in the banking operations as shown in table 6 through both the models. In year 2006, 2008, 2009 & 2010 the trend is same via both models. Year 2006, 2009 and 2010 showed 100% efficiency level of private banks, whereas in 2007-08 it presented a decrease in efficiency score. As per CCR model it is 0.959 while by BCC model 0.988 efficiency which is near by 1. The tendency in year

2007 is different in both models as CCR told 0.983 score while BCC recorded 1 efficiency score.

Table 6: DEA Efficiency Scores of PrSBs of India

Years/Model	CCR-I	BCC-I	CCR-O	BCC-O
2005-06	1	1	1	**1**
2006-07	0.983	1	0.983	**1**
2007-08	0.959	0.988	0.959	**0.988**
2008-09	1	1	1	**1**
2009-10	**1**	**1**	**1**	**1**

Taking a holistic view of the picture, our hypothesis is accepted as private banks showed an upgrading level of efficiency after the successful adoption of information technology.

FOREIGN BANKS

The efficiency scores from the analysis clearly indicate foreign banks as leaders with the highest efficient level as 1 in all the years by both the models (table 7). It is clearly shown that foreign banks are the soon familiar with IT innovations as compare to other groups.

Table 7: DEA Efficiency Scores of FBs of India

Years/Model	CCR-I	BCC-I	CCR-O	BCC-O
2005-06	1	1	1	**1**
2006-07	1	1	1	**1**
2007-08	1	1	1	**1**
2008-09	1	1	1	**1**
2009-10	**1**	**1**	**1**	**1**

Our hypothesis is accepted after carefully gauging the efficiency scores of foreign banks which shows clearly that they have achieved the top level efficiency after the introduction of information technology in banking area.

CONCLUSIONS OF THE STUDY

As the results show, there is an increasing trend in performance of Indian banks caused by IT innovation and enlarged investment in new information technology during the recent time period (2005-06 to 2009-10). The banks were left with no option but to improve their functional attitude, strategies and policies, efficiently allocating the IT elements with proper guidelines to use them in the presence of required trained staff. Introduction of new technology-based services to their customers, for e.g. e-banking, mobile banking, ATM facility and card based funds transactions, etc. became a part of their functional norms. The SCBs made heavy investment in technology and computerization of branches from last few years, introduced new services and facilities to the customers which helped the banks to survive in the long run, i.e. to retain their existing customers and attract new ones (RBI, 2010). Taking the whole view, the most efficient banks group is FBs followed by both groups. There is not so much difference in PSBs and PrSBs but as compare in both PrSBs are the best. Hence, Indian commercial banks have improved efficiency and performance after the advent of IT in recent era.

RBI is constantly taking steps to increase the use of IT in the functioning of Indian banks. Recently major initiatives were taken in Electronic Payment Systems with the 'Vision Document' on Payment and Settlement Systems for the year 2009-2012. The document clearly identifies the new frontiers and a road-map for implementation of new projects The vision includes implementation of a new RTGS system which would provide additional features including that for liquidity management, India Money Line – a 24x7 system for one-to-one funds transfers, India Card – a domestic card initiative, redesigned ECS to function as a truly Automated Clearing House (ACH) for bulk transactions, and mobile payments settlement network. The growing trend in the usage of various modes of payment is a clear indication of the momentum acquired in the area of payment systems. The card-based payment systems have been evolving over the period. The card-based payment system in the country covers credit/debit and prepaid cards. About 230 million cards have been issued in the country. We have been witnessing an increase in the usage of cards (debit, credit) across various delivery channels like ATMs, Point of Sale (POS), internet transactions, etc. On an average, 396 million transactions of value one lakh crore are being processed during a month using these cards (RBI, 2011).

The evolving payment systems and other IT enabled culture poses new challenges and opportunities to all segments of this industry. To leverage on the opportunities provided by new products, the system providers/banks need to ensure that the challenges are adequately addressed. It also has to be ensured that the products cover all segments of the population and provide an incentive to adopt these products. The regulatory process would support all orderly development of new systems and processes, within the legal mandate. The challenge before all the stakeholders including banks and non-bank players, IT vendors, other service providers, etc. is how to introduce such a next generation payment and settlement system and solutions that is needed to take the country into the 21st century.

REFERENCES

[i]Awdeh & Moussawi, (2009), "Bank Efficiency and Foreign Ownership in the Lebanese Banking Sector", *Review of Middle East Economics and Finance*, Vol. 5, No. 2, Article 4, Available at http://www.bepress.com/meef/vol5/iss2/art4

[ii]Basle Committee, (1998), 'Report on enhancing bank transparency', Paper No. 41, http://www.bis.org/publ/bcbs41.pdf, accessed on 11 May 2004.

[iii]Brynjolfsson and Hitt, (1996), "Paradox lost? Firm-level evidence on the returns to information systems spending", *Management Science*, Vol.42, No. 4, pp.541-558.

[iv]Bhattacharyya *et al.*, (1997), "The Impact of Liberalization on the Productive Efficiency of Indian Commercial Banks", *European Journal of Operational Research*, Vol. 98, pp. 332-345.

[v]Charnes, Cooper & Rhodes, (1978), "Measuring the Efficiency of Decision Making Units", *European Journal of Operational Research*, Vol.2, No. 6, pp. 429-444.

[vi]Charnes *et al.*, (1994), "Data Envelopment Analysis: Theory, Methodology and Application", *Kluwer Academic Publishers*, Boston.

[vii]Choudhari & Tripathy, (2004), "Measuring Bank Performance: An Application of DEA", *Prajnan*, Vol. XXXII, No. 4, pp.287-304.

[viii]Claessens *et al.*, (2000), "How does foreign entry affect the domestic banking market"? in Claessens and Jansen, eds., *The Internationalization of Financial Services: Issues and Lessons for Developing Countries* (Dordrecht, Holland, Kluwer).

[ix]Clarke *et al.*, (2000), "The effect of foreign entry on Argentina's domestic banking sector", in Claessens and Jansen, Eds. *The Internationalization of Financial Services: Issues and Lessons for Developing Countries* (Dordrecht, Holland, Kluwer).

[x]Cooper *et al.*, (2000), "Data Envelope Analysis", *Kluwer Academic Publishers*, Boston.

[xi]Das *et al.*, (2000), "Technical, Allocative and Scale Efficiency of Public Sector Banks in India," Reserve Bank of India, *Occasional Papers*, Vol. 18, Nos. 2&3, pp. 279-301.

[xii]Debaprosarma Nandy, (2010), "Banking Sector Reforms in India and Performance Evaluation of Commercial Banks", Dissertation.com, Boca Raton, Florida, USA, pp. 94-113, 177-180.

[xiii]Demirgüç-Kunt, Asli and Harry Huizinga, 1997, "Determinants of commercial bank interest margins and profitability: some international evidence", World Bank Policy Research Working Paper No. 1900.

[xiv]Department of Banking Supervision, (2002), RBI Mumbai, accessed through Internet at http://www.rbi.org.in

[xv]Donthu *et al.*, (2005), "Benchmarking Marketing productivity Using Data Envelopment Analysis", *Journal of Business Research*, Vol. 58, pp. 1474-1482.

[xvi]Dos Santos et al., (1993), "The Impact of Information Technology Investment Announcements on the Market Value of the Firm", *Information Systems Research*, Vol. 4, pp. 1-23.

[xvii]Dyson *et al.*, (1998), "Data Envelopment Analysis", Warwick Business School, http://www.csv.warwick.ac.uk/~bsrlu/dea/deat/deat1.htm.

[xviii]Gelb and Sagari, (1990), "Banking", in Messerlin, P. and K. Sanvant, eds., *The Uruguay Round: Services in the World Economy* (Washington, D.C., World Bank and United Nations Centre on Transnational Corporations).

[xix]Gunjan M. Sanjeev, (2006), Data Envelopment Analysis (DEA) for measuring Technical Efficiency of banks, The Journal of Business Perspective Vol. 10 No. 1 pp. 13-27.

[xx]Gupta *et al.*, (2008), "Dynamics of Productive Efficiency of Indian Banks", *International Journal of Operations Research*, Vol. 5, No. 2, pp. 78-90. Oxford University Press, New Delhi.

[xxi]Healy & Palepu, (2001), "Information asymmetry, corporate disclosure, and the capital markets: a review of the empirical disclosure literature', *Journal of Accounting & Economics*, Vol. 31, No. 1–3, pp. 405–40.

[xxii]Institute for Development and Research in Banking Technology (IDRBT), (2010), Financial Stability Report, RBI Mumbai, accessed through Internet at http://www.rbi.org.in

[xxiii]Kamakura & Ratchford, (1996), "Productivity assessment of multiple retail outlets", *J Retail*, Vol. 72, No. 4, pp. 333-56.

[xxiv]Kumar and Varma, (2003), "Technical efficiency, Benchmarks and Target: A Case Study of Indian Public Sector Banks", *Prajnan*, Vol. 31, No. 4, pp. 275-300.

[xxv]Levine (1996), "Foreign banks, financial development and economic growth", in Claude

[xxvi]E. Barfield, ed., *International Financial Markets* (Washington, D.C., AEI Press).

[xxvii]Lichtenberg, (1995), "The Output Contributions of Computer Equipment and Personnel: AFirm-Level Analysis", Economics of Innovation and New Technology, vol 3, p. 201-217.

[xxviii]Loveman, (1994), "An Assessment of the Productivity Impact of Information Technologies", T.J. Allen and M.S. Scott Morton (Eds.), *Information Technology and the Corporation of the 1990s: Research Studies*, *MIT Press*, Cambridge MA.

[xxix]Lunardi, Becker and Macada, (2003), "The impact of IT investments on banking Industry performance and evaluation: evidences from cross country analysis for Brazil, United States, Argentina, Uruguay & Chile".

[xxx]Mittal and Dhingra, (2007), "Investment in Information Technology and its Impact on Productivity and Profitability of Public Sector Banks

in India", *Productivity Journal*, National Productivity Council, Lodhi Road, New Delhi.

[xxxi]Mohan, (2005), "India's experience with financial sector development", In: Basu P (ed) India's Financial Sector: Recent Reforms, Future Challenges. Macmillan India Ltd., New Delhi.

[xxxii]Morrison & Bernlt, (1990), "Assessing the Productivity of Information Technology Equipment in the U.S. Manufacturing Industries", *National Bureau of Economic Research*, Working Paper #3582.

[xxxiii]Mukherjee et al., (2002), "Performance Benchmarking and Strategic Homogeneity of Indian Banks", *International Journal of Bank Marketing*, Vol. 20, No. 3, pp. 122-139.

[xxxiv]Narasimham Committee (1991) Report on Banking Sector Reforms (Chairman M. Narasimham) (http://www.rbi.org.in, accessed on 17 May 2004).

[xxxv]Oral & Yolalan, (1990), "An empirical study on measuring operating efficiency and profitability of bank branches", *European journal of operational Research*, Vol. 46, pp. 1282-94.

[xxxvi]Parsons, Gotieb & Denny, (1993), "Productivity and Computers in Canadian Banking", Z. Griliches and J. Mairesse (Eds.), *Productivity Issues in Services at the Micro Level*, Kluwer, Boston.

[xxxvii]Paulraj, (2001), "Data Warehousing Fundamentals", *John Wiley & Sons*, Singapore.

[xxxviii]Prasad & Harker, (1997), "Examining the Contribution of Information Technology towards Productivity and Profitability in U.S. Retail Banking", *Wharton School*, University of Pennsylvani.

[xxxix]Rangarajan Committee (1989) Report on the Modernisation of the Banking Sector (Chairman C. Rangarajan) (http://www.rbi.org.in, accessed on 17 May 2004).

[xxxx]Reddy, (2006), "Use of Technology in the Financial Sector: Significance of Concerted Efforts", *Speech delivered at IDRBT*, Hyderabad.

[xxxxi]Reserve Bank of India, (2004), "Computerisation in banking industry – statistics", http://www.rbi.org.in , accessed on 17 May 2004.

[xxxxii]Reserve Bank of India, (2006-10), Annual Accounts Data of Scheduled Commercial Banks, Mumbai: RBI.

[xxxxiii]Reserve Bank of India, (2006-10), Reports on Report on Trend and Progress of Banking in India, Mumbai: RBI.

[xxxxiv]RBI, (2010), Financial Stability Report, December 2010, *RBI Publication*, Mumbai: RBI.

[xxxxv]RBI, (2011), "Monetary Policy Statement 2010-11", chapter IT enhancement in banks, *RBI Publication*, *RBI Monthly Bulletin*, Feb 2011, accessed through Internet at http://www.bulletin.rbi.org.in .

[xxxxvi]Rezvanian *et al.*, (2008), "Efficiency Change, Technological Progress and Productivity Growth of Private, Public and Foreign Banks in India: Evidence from the Post-Liberalization Era", *Applied Financial Economics*, Vol. 18, pp. 701-713.

[xxxxvii]Rishi & Saxena, (2004), "Technological Innovations in the Indian banking industry: the late bloomer", *Accounting, Business & Financial History*, Vol. 14, pp. 339–353.

[xxxxviii]Sathye, (2003), "Efficiency of Banks in a Developing Economy: The Case of India", *European Journal of Operational Research*, Vol. 148, pp. 662-671.

[xxxxix]Sensarma, (2005), "Cost and profit efficiency of Indian banks during 1986-2003: a stochastic frontier analysis", *Economic and Political Weekly*, Vol. 40, pp. 1198-1208.

[l]Sensarma, (2008), "Deregulation, Ownership and Profit Performance of Banks", *Applied Financial Economics*, Vol. 18, pp. 1581–1595.

[li]Shanmugam & Das, (2004), "Efficiency of Indian commercial banks during the reform period", *Applied Financial Economics*, Vol. 14, pp. 681–686.

[lii]Shirai, (2001), "Assessment of India's Banking Sector Reforms from the Perspective of The Governance **of** The Banking System", *presented at* the Escap-Adb Joint Workshop On "Mobilizing Domestic Finance For Development: Reassessment Of Bank Finance And Debt Markets In Asia And The Pacific", *Bangkok*.

[liii]Shroff, (2004), "Impact of Technology on Banking", *IBA Bulletin*, pp. 174-181.

[liv]Sunil & Rachita, (2010), "Dynamics of Cost Efficiency in Indian Public Sector Banks: A Post-deregulation Experience", submitted for presentation in the *Twelfth Annual Conference on Money and Finance in the Indian Economy*, 11th and 12th March, 2010, pp. 1-41.

[lv]Vassiloglon & Giokas, (1990), "A study of relative efficiency of bank branches: an application of data envelopment analysis", *Journal of the Operational Research Society*, Vol. 41, No. 7, pp. 1591-97.

[lvi]Vittaldas Leeladhar, (2006), Recent Banking Developments in Indian, *The Foundation of Economic Research*, BIS Paper no. 28, part 14.

[lvii]Walter & Gray, (1983), "Protectionism and International Banking, Sectoral Efficiency, Competitive Structure and National Policy", *Journal of Banking and Finance*, vol. 7, pp. 597-607, 609.

[lviii]Zenios *et al.*, (1999), "Benchmarking of efficiency of bank branches", *Interfaces*, Vol. 29, No. 3, pp. 133-51.

ABSTRACT

Technologies today play major role in solving many kinds of problems such as decision supporting systems. A survey was conducted to several bankers in Bahrain banks to identify the factors that significantly affect the DSS success or failure. Four factors were set which are Technology, People, Communication and Rules and procedures. The result showed that the first three factors mentioned above have a great effect on the success of a decision support system while the more restrictions, rules and procedure will lead to a weak decision support system.

Impacts of Decision Supporting Systems on Decision Making

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KEYWORDS

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

PREAMBLE

Decision support systems (DSS) are information systems – computer based - that support business or organizational decision-making activities. DSSs serve the management, operations, and planning levels of an organization and help to make decisions which may be rapidly changing and not easily specified in advance.

Decision making is becoming more and more complex over time with the huge change of customer base, competitors, regulations and unstable business environments. Therefore the need of a decision support system is rapidly increasing to enhance the level of accuracy in decision making for management.

DSSs include knowledge-based systems. A properly designed DSS is an interactive software-based system intended to help decision makers analyze useful information from raw data, documents, personal knowledge, or business models to identify and solve problems and make decisions.

In more details, decision support systems can be categorized into two categories, in one hand there is the one which needs the supervision of decision maker directly, these are the unorganized, not well defined decisions and more critical and complex. On the other hand there are the simple decision situations where there is no need for the decision maker direct supervision and the decision can be made automatically by the decision support system (DSS) after setting all the attributes according to the business need. [Figueira et al, 2005] stated that "Multi-criteria analysis offers a variety of methodologies and tools to solve sorting and classification problems" while George Rigopoulos 2008 make it clearer that "all existing methodologies of decision support systems focuses on ordered categories" were the need is becoming more critical of handling ordered and not ordered categories of decision support systems which is called Intelligent Decision Support Systems.

CHALLENGES AND PROBLEMS

DSS failure can lead to more than just expensive in terms of productivity, money or redesign of later processes, but in some cases can cause losses of life.

Unfortunately, the history is filled up with examples of how misunderstanding of decision support problems can lead to disasters. To give a clear image sees the following example. In 1988, U.S. Navy warship accidentally shot down an Iranian commercial passenger due to a poorly designed weapons control system. The deep down investigation says nothing was wrong in the system software and hardware, but that the problem was caused by insufficient and complex display of information to the controllers (van den Hoven, 1994). In details, the problem leading to the decision to shoot down the Iranian was the observation that he was descending towards the ship, when in fact it was climbing from the ship. The display tracking the airliner was not designed properly which required controllers to "compare data taken at different times and make the calculation in their heads, on scratch pads, or on a calculator - and all this during combat (Lerner, 1989)."

The main objective of this paper is to study the effect of DSSs on the Business sector and the potential uses of such systems, as an example this paper will focus on the use of DSS to make strategic decisions and their impact on planning for the future of the organization.

The paper is organized in six sections, including this introduction. Followed by general literature review. Next chapter introduced the research methodology. Then a discussion section of the challenges of using DSS in details will brief the major challenges faced. Finally, concluded with which parts really affect the success of a decision support system.

LITERATURE REVIEW

In the early years of computers the main concern was to build programs that will help businesses in performing clerical works, a little after that people started to think about the potentials of manipulating the gathered data in order to have a more efficient business procedures, some of the areas that caught the business owners was cost reduction, locating target audience for marketing and other operational tasks.

After that when the management faced obstacles in making decisions regarding the future and was not able to easily come to those decisions, the need for an assisting decision support system was raised , some systems were made to predict the probability of some events to occur based on some assumptions to form a perception.

DSS DEFINITIONS

Decision support system is a computer-based information system which includes knowledge based systems to support decision making activities. The decision is mode upon a choice of alternatives based on estimation of the values of those alternatives (Manpreet, Parvinder, and Sumitter Bir Singh 2008).

The idea behind decision supporting is helping managers to work alone or in a group to make better choices. In practice, references to DSS are usually references to computer applications that perform such a supporting role. DSS are "interactive computer-based systems that help decision makers utilize data and models to solve unstructured problems" (V. S. Janakiraman and K. Sarukeshi, 2001).

"DSS are computer-based systems that assist business and organizational in complex decision-making environment" (Rosmayati Mohammed)

Some authors said that, the DSS does not specify an optimum decision [Samson,' 88], but rather helps a decision maker to clarify options. A DSS includes applications used by decision makers which specifically assist in understanding or structuring the decision. These researchers look at the ability of an application to generate stochastic measures and to implement sensitivity analyses on data. Others [L.e Blanc et al, '89; Beau Clair, 1985] have defined DSS more broadly and have included any computer based application or group of applications that can be used by decision makers to help them to clarify and analyze their options. A word processor, spreadsheet, or database is designated as a DSS tool by this group.

Ayati [1987] presents one model of the use of a DSS. The Decision maker accesses a database or previous (individual) knowledge and draws information. Utility of that information is analyzed and future probable scenarios are reviewed using the DSS.

George Rigpoulos [2008] found that the DSS supports assignment of actions (numbers, projects, people etc.) into predefined categories according to their score on evaluation criteria.

"Various forms of decision making occur at various levels". Hillier and Lieberman ['2002], for Example, consultants and people related to operation research will effect the structure of the database and it's optimization more than the formulation of tactical or strategic plans on the other hand Orr (2002) indicates that managing the interests of stakeholders requires current and accurate information about changing needs, concerns, requirements, best practices, and trends in affiliations and cost tradeoffs which shows the urgent need for a decision support system . Holsapple viewed DSS as a computerized system with knowledge representation and knowledge processing in order to strengthen decision making to be more productive, agile, innovative and reputable.

This study identifies a DSS as any application that helps the decision maker to identify or solve a problem by providing estimations, calculations about the choices available. It is the decision maker's use of the application rather than the technology itself which identifies a DSS.

DSS BENEFITS

There are many benefits of DSS both for the management and the organization as a whole. These benefits include: help to reduce decision cycle time for an organization and offering the managers enough time to be creative in more complex areas. Another advantage of the decision support systems is that the use of decision support system in an organization provides a competitive advantage over other organizations which do not use DSS. Also, DSS provide High satisfaction among decision makers and enhance organizational control. Typical intelligence activities that a DSS supports include accessing all information assets, including legacy and relational data sources, comparative data figures, projected figures based on new data or assumptions, consequences of different decision alternatives, given past experience in a specific context. Ion ISTUDOR, Luminita DUTA [2010]. Further more, James R. Marsden [2008] found that the E-retailers can use DSSs to make dynamic price adjustment decisions as the market landscape shifts or competitors alter their pricing structure

As described below, this study will focus on the importance of DSS in making decision in the financial companies. For example, DSS provide an environment that allows the cash manager to explore decisions concerning the less structured cash management tasks, the model is mathematical along with graphical representations to be the primary tool to preview high volume of information provided. A complete description of the methodology used to build such system presented by Parker and Bill in 1985. The outcome was a Decision Supporting System that user friendly and interactive with the formal cash management model. Moreover, the result was giving the ability to the system to provide direct recommendations about simple and structured tasks which on the other hand, allowing the manager to focus on the unstructured tasks, which indeed need more thinking, intelligence and experience. With both numerical results alongside with graphical representations on the huge volume of the information the system is now capable of doing the "What If" analysis which is a very powerful tool which helps the

manager predict the future and be aware of the results of his decisions.

METHODS AND HYPOTHESIS

This paper will identify the effect of new intelligent decision support systems on the business sectors. This paper will follow the empirical method to study the effects of our below listed variables on the success of the intelligent decision support system.

Figure 1: Research Model

a. Dependent Variable:
This papers dependent variable is "Success of Intelligent Decision Support System" and we will study the effects of the below independent variable
b. Independent Variables: **A. User Training** **B. Experience**

A. TECHNOLOGY

Does the technology really affect the decision making process? Does the managerial training for the system affect the success of decision making process?

The following hypothesis has been set to answer the previous questions.

H1(1): More investment in technology will increase the probability of DSS success.

H1(0): More investment in technology will not increase the probability of DSS success.

B. PEOPLE

Ein-Dor ef ai. found that system use increases over a period of time and then declines as a user becomes familiar with the system. Contrary to that research, Fuerst found no relationship among implementation success and the length of time the system has been in use and top management support. This leads us to a controversy that will be solved by the following hypothesis.

H2(1): DSS success will increase as a user becomes familiar with the system and become more expert in the company needs and activities.

H2(0): DSS success will not increase as a user becomes familiar with the system and become more expert in the company needs and activities

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C. COMMUNICATION AND RULES

Communication between decision makers is a key role as many authors stated and this paper will set the light on the effect of communication level on the success of decision support system.

H3(1): The high level of communication between the decision makers will increase the ability of getting best result from DSS.

H3(0): The high level of communication between the decision makers will not increase the ability of getting best result from DSS.

D. RULES AND PROCEDURE

The decision making process depends on two factors generally as mentioned above, the level of difficulty of the problem and the constraints on the decision makers prior of making a decision. To find out the level of effect, see the below hypothesis.

H4(1): It is assumed that the more strict rules and procedures in the company open more opportunities in success of DSS.

H4(0): It is assumed that the more strict rules and procedures in the company will not open more opportunities in success of DSS.

DATA GATHERING

The process of distribution of the survey was very difficult and managers refused to cooperate but with the hard work and with help of some friends the job was done. After distributing one hundred fifty electronic questionnaires, it's received fifty nine replies from bankers in different positions in several Banks in Bahrain.

RESULTS AND FINDINGS

After analyzing the results gathered in SPSS and with the use of regression it'd found out the following:

H1(1): More investment in technology will increase the probability of DSS success.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.057-	.226		-.251-	.802
	Technology	1.019	.056	.923	18.167	.000

a. Dependent Variable: How do rate the role DSS systems play in decision making process

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	S
1	Regression	89.464	1	89.464	330.032	.0

Analysis says that on average 79.66% agrees that technology play major role in the success of a decision support system and can provide very valuable, accurate and critical information. Everyday passes technology is becoming able to do very complex analysis on huge amount of data. As the figure shows above that the F value is very big which indicates a very strong relationship between the technology variable and the success of the decision support systems. Also when considering the coefficients it's found that beta is very close to 1.00 which leads us to accept the alternative hypothesis.

H2(1): DSS success will increase as a user becomes familiar with the system and become more expert in the company needs and activities.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.189-	.331		-.570-	.571
	People	1.115	.088	.860	12.718	.000

a. Dependent Variable: How do rate the role DSS systems play in decision making process

ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.

1	Regression	77.578	1	77.578	161.754	.000a
	Residual	27.337	57	.480		
	Total	104.915	58			

a. Predictors: (Constant), People

b. Dependent Variable: How do rate the role DSS systems play in decision making process

Analysis shows 70% of the bankers from different levels of positions in Bahraini banks see that the level of experience on the system increase the understanding of the critical points managers require to focus on to achieve the goal of success of the decision support system. Another question was about the level of training a decision maker has on the system and they also believe that user training can improve the process even without experience on the decision support system DSS. While the SPSS results shows clearly that F value is too big in the above figure which shows the relationship between the variables. On the other hand, the beta variable is 0.860 on the coefficients table which is less than technology variable but still the relationship is strong which means that the variable against the alternative hypothesis is accepted as many bankers stated in the survey.

H3(1): The high level of communication between the decision makers will increase the ability of getting best result from DSS.

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	-.022-	.287		-.078-	.938
	Communication	1.012	.071	.883	14.169	.000

a. Dependent Variable: How do rate the role DSS systems play in decision making process

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	81.716	1	81.716	200.771	.000a

a. Predictors: (Constant), Communication

b. Dependent Variable: How do rate the role DSS systems play in decision making process

For this hypothesis two questions in the questionnaire was set. The first one was about the way decision makers communicate and the behaviors of them and the second was about the level of support of top management. The result for this hypothesis is amazing; as average 93% shows that the level of communication between decision makers and the support of top management is a key variable in this equation for the success of a decision support system, some managers stated that top management support and giving them the space of creative thinking can definitely enhance decision making. After all these facts and results it's finally can be declared that this hypothesis is accepted specially when the result supported by the result of SPSS linear regression which shows value of F is equal to (200.771) and value of sig is equal to (0.000) in the ANOVA table and the value of the beta is 0.883.

H4(0): It is assumed that the more strict rules and procedures in the company will not open more opportunities in success of DSS.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.864	1	1.864	1.850	.097a
	Residual	57.272	57	1.005		
	Total	60.136	58			

a. Predictors: (Constant), Rules

b. Dependent Variable: How do rate the role DSS systems play in decision making process

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.542	.216		25.669	.097[a]
	Rules	-.741-	.081	-.770-	-9.109-	.097[a]

a. Dependent Variable: How do rate the role DSS systems play in decision making process

It's very obvious from the survey that decision makers reject this hypothesis since averages of 84% disagree with the hypothesis as the survey shows. Although some of the bankers accepted that more rules means more organized work but the majority thought that more rules means more obstacles against change and success.

The result is SPSS shows that the sig value is grater that 0.05 and the beta variable is -0.770 which is far beyond 1.00 then the alternative hypothesis is rejected and null hypothesis is accepted.

5. Discussion

This study has explored many variables that may affect the success of decision support system. For example, the support of top management is a critical key in success of decision support systems as many decision makers think while providing the managers with some space of creativity can significantly affect the equation. Moreover, it's found that the more advanced technology the organization has the more percentage of success to the DSS since technology can provide massive productivity assistance to the managers in organizations. While experience can play major role of the success of the system, decision makers do believe that more training on the system will improve the process since some decisions can be made wrongly due to lack of proper training and might lead to catastrophic results. On the other hand they are totally convinced that experience play more role than training in leading towards success of Decision Support Systems.

This research spot the light on other factors also like the level and way of communications between decision makers which seems to be the most important factor.

It's really confusing and surprising knowing that organizing the procedures and putting more restrictions, rules may lead to weak decision support system as found from the survey to decision makers. Although some of the decision makers think that organizing the work by setting rules and restrictions can enhance the professionalism and productivity within an organization.

After combining all the variables together and make a regression with the DSS Success variables it's concluded that the combined alternative hypothesis is accepted meaning overall variables make a huge affect on DSS success. See the below table, which clearly agrees with Janakiraman.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	80.286	1	80.286	185.810	.000[a]
	Residual	24.629	57	.432		
	Total	104.915	58			

a. Predictors: (Constant), AllVariables

b. Dependent Variable: How do rate the role DSS systems play in decision making process

REFERENCES

i. Figueria, J. ,S. Greco and M. Ehrgott,2005,Multiple Criteria Decision Analysis: State of the Art Surveys.

ii. Van den Hoven, M. J. (1994). "Towards ethical principles for designing politicoadministrative information systems." Informatization and the Public Sector, 3, 353-373.

iii. V. S. Janakiraman and K. Sarukeshi "Decision Support Systems" Prentice-Hall of India Private Limited, New Delhi, 2001, pp.26-77

iv. Samson, Danny, Managerial Decision Analysis, D. Irwin, Homewood, Ill., 1988

v. Le Blanc, A. ;Jelassi, M. Tawfik; DSS Software Selection: A Multiple Criteria Decision Methodology, Information & Management, vol.17, no 1 , August, 1989

vi. Beauclair, Renee A., The Computer as Communication Tool: The Case of Computer Facilitated Group Decision Making, Indianapolis, In., April 4-6,1985

vii. Lerner, E.J. (1989,April) "Lessons of flight 655". AEROSpace America, 18-26

viii. Ayati, M. B., A Unified Perspective on Decision Making and Decision Support Systems, Information Processing & Management, vol. 23 no. , 1987

ix. Hillier, Frederick S.; Lieberman, Gerald J., Introduction to Stochastic Models in Operations Research, McGraw Hill Publishing, New York, 1990

x. Orr, R. (2000). "The Timing of Medical Technology Acquisition: Strategic Decision Making ofTurbulent Environments," Journal of Healthcare Management, Vol. 445, No.5, pp. 330-331.

xi. Loebecke, C, P.C. Van Fenema, and P. Powell (1999)."Co-Opetition and Knowledge Transfer," DataBase for Advanced in Information Systems, Vol. 30,pp.14-25.

xii. Salmela, H., Lederer, A.L., and Reponen, T(2000). "Information Systems Planning in a Turbulent Enviroment European Journal of Information Systems, Vol.9, pp.3-15.

xiii. Dauten, D.(1999). The Gifted Boss, New York: William Morrow & Co.

xiv. Parker, D.C. and P.C. BeU (1985) "Developing a Visual Interactive Model for Corporate Cash Management," Journal of The Operational Research Society, Vol. 36, No. 9.

xv. Ein-Dor, P. and Segev, E."Organizational CcvvCo Context and the Success of Management Information Systems, Volume 24, Number 6,1978,pp. 1064-1077

xvi. Furest, WL. An Investigation Into the Factors that may affect Perceived Utilization of Computer Based Decision Support Vol 9.

xvii. Decision Support Systems (DSS) in Construction Tendering Process Rosmayati MOHEMAD1, Abdul Razak HAMDAN2, Zulaiha ALI OTHMAN2 and Noor Maizura MOHAMAD NOOR1, IJCSI International Journal of Computer Science Issues, Vol. 7, Issue 2, No 1, March 2010

xviii. C. W. Holsapple, "Decisions and Knowledge," Handbook on Decision Support Systems1, International Handbook on Information Systems F. Burstein and C. W. Holsapple, eds., pp. 21-53: Springer Berlin Heidelberg, 2008.

xix. Ion ISTUDOR, Luminita DUTA , "Web-Based Group Decision Support System: an Economic Application", Valahia University, Targoviste, Romania, Information Economic vol. 14, no. 1/2010

xx. Manpreet Singh, Parvinder Singh, and Sumitter Bir Singh, Decision Support System for Farm Management World Academy of Science, Engineering and Technology 39 2008, vol 4, p.1,

xxi. George Rigopoulos, John Psarras and Dimitrios Th. Askounis, School of Electrical and Computer Engineering, National Technical University of Athens, Journal of Applied Sciences 8 vol 3 , P. 443-452,2008

xxii. James R. Marsden, The Internet and DSS: massive, real-time data availability is changing the DSS landscape, Information Systems & e-Business Management; Apr2008, Vol. 6 Issue 2, p193-203, 11p

BIS: Web Based ERP to Support Small Entrepreneurs

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ABSTRACT

Software as services is link to the concept of cloud computing is a style of computing where information technologies enable business products, services and solutions as a service over the internet. The concept of SAS (software as services) is currently in very early stages of development. There are a lot of researches being carried out in this area. Authors focus to analyze the SAS and also to propose a concept based on qualitative studies for business process integration and Industrial collaboration, in the context of small businesses. The primary aim of their research work is to integrate process not only within the organization but also with the partners and customers.

EYWORDS

Software as services (SAS),	Cloud Computing
SMEs, Business Process integration	B2B collaboration

PREAMBLE

Enterprises are increasingly in use with rapid business environments that requiring the need to respond to fast moving windows of opportunities and respond to challenges and growth possibilities and shorter lead-time for decision making. Swift environmental changes, diverse business developments and continuous improvement in their information system, many organizations think to enhance their business processes through integration and B2B (business to business) collaboration. The enterprises today are forging ahead with the effort of integrating information systems across corporate boundaries to unite the customers, suppliers and any other business partners with which they interact [13,14]. They use the information regarding their finances, employees, and to manage the items or assets they own.

The focus of this study is to make the structure, constant and smooth flow of information with help of Web based services in efficient manners to support SMEs in textile sector with uniform graphics interface, as the interface is the gauge for the success of applications. As in SMEs, the textile manufacturing process is divided into clusters e.g. ginning, spinning, weaning, processing and made ups. Only few corporate level industries possess their own complete units for manufacturing. SMEs sector majorly faces the problem due to dis-integration and cluster based industry in different geographical locations. As they have to support each other in value addition process of a product.

BACKGROUND

Small Businesses have been facing tremendous changes within economic, commercial and technological environments. It is evolving an urgent problem for them how to utilize information technology and to build an effective information system. The poor performance is only due to limited resources and unawareness about the Information system capabilities, poor implementation, lack of business processes integration and industrial collaboration.

Due the limited resource and lack of IT expertise most of the organization do not have their own complete information system. As the installing, developing and maintenance of ES (Enterprise system) is very expensive as only the big or corporate level organization can bear the cost [15, 16]. Pakistani entrepreneurs have been facing tremendous changes within economic, commercial and technological environments e.g., excessive regulation, energy shortage, water shortage, difficulties in marketing and selling the products, unawareness about the technology, lack of expertise in information technologies, obsolete technology, limited R&D (Research and Development) support, lack of capital and financial resources, low skill mix of the labor / work force, limited productivity of works and rising competition due to imported products. [8]

SMES IN PAKISTAN

Small **M**edium **E**nterprise sector is the backbone of Pakistan economy, as it plays vital role in the social and economical development of the Pakistan. According to the statistics collected from SMEDA (**S**mall **M**edium **E**nterprise **D**evelopment **A**uthority), there are about 3.2 million business enterprises in Pakistan, (44% Rural & 56% Urban), where they produce a wide range of goods and services, provide employment for a large number of skilled and semi-skilled workers, account for a substantial proportion of manufacturing output, and make a major contribution to the country's balance of payments. [7] Author focus of attention on the textile manufacturing related SMEs is, specifically in Faisalabad. As Faisalabad is the third largest city of Pakistan having 45932 SMEs manufacturing units, from them 22378 related to business of textile sector.

Table.2 Total Number of SMEs in Textile clusters in Faisalabad

✓	*Ginning*	*Units:* 26
✓	*Spinning*	*Units*: 44
✓	*Weaving*	*Units:* 21842
✓	*Printing*	*Units*: 192
✓	*Apparel & Made Ups :* Small & Medium 274, Large Units 12000 registered 300	250,000

Table.4 Survey results on SMEs
✓ *Entrepreneur's Education:* **Only 49% entrepreneur in SMEs sector having college or graduate level qualification.**
✓ *Technical Training*: **70% entrepreneur in SMEs sector had not obtained any training.**
✓ *Computer Usage:* **only 46% have computer. While from them 57% SMEs it for just maintaining books of accounts while 43% for letter writing/email/internet.**
✓ *Power Outages*: **62% did not have their own power generation mechanism.**

CLOUD COMPUTING IMPLICATIONS

It is a style in which all the information technology related capabilities are providing services and transferring technology, data and software applications from local systems thought network into Clouds. According to the [3] "the aims of the cloud computing is the migration of users", data and processing from desktop PCs (client system) and corporate servers to the cloud [3]. It is also defined by [4] why not just move all processing power to the cloud and walk around with an Ultra-light input device with a screen? The Cloud computing brought a lot of services i.e. database, storage, backup, data replication, data protection and maintain the security of the services [4, 9]. Cloud computing in simple words is the delivery of services or capabilities over the network and it is segregated into three following entities.

a) ***Software as a service (SaaS):*** **Applications based services delivered over the network.**
b) ***Platform as a service (PaaS):*** **A software development framework / components all delivered on the network on demand, the users have to pay.**
c) ***Infrastructure as a service (IaaS):*** **An integrated environment of computing resources, storage and network fabric delivered to network users have to pay for usage model.**
d) ***Hardware as Layer (HaaS)***
e) ***Virtualization as Layer (VaaS)***

SAS BASED ERP

Software as a service is link to the concept of cloud computing a new paradigm e.g., Google apps [12]. The paradigm focuses on sharing data and computation power over the scalable network nodes. Nodes include the end user computer, data center and web services [9]. Software as a service term is used to provide software and application based services to users on their demand. It is also defined by [10] today most of services we use on the web, are not just the web pages but are the web based applications that we access through network using a browsers. It is increasingly prevailing distribution model based on applications that are hosted by provider to customer through the network. It is a mature and a new development approach. [9] A lot of IT expertise companies offers this SOA (Service oriented architecture) through web where the user has to pay against the desired services e.g., SAS based ERP, E-supply chain management, CRM. As ERP (enterprise resource planning) changed from traditional Client / Server environment to the web based and Internet / Intranet network computing support environment along with user oriented approach for usability perspective [17], [18]. Web based services are the new breed of web based applications. These services performed different functions from simple to complex business processes.

A great benefits of SAS based ERP is that remote user like executive and sale person, can access the data with the help of browser. It removes the problems from the investment towards the maintences of server and other hardware's. It also removes your problems for new add-one feathers, upgrades, easier management, compatibility, effective collaboration and global accessibility.

Different companies provide similar service oriented architecture through browsers in order to solve the enterprise problems and to derive their perspective solutions. **BScaler enterprise recourse Manager™**, **Black Soft** and **Web ERP™**, **Salesforce.com** and **Sugar CRM** provides SAS based ERP to Small and medium level industries which include Business 2 Business (B2B), CRM and e-supply Chain services [10]. **SaaSplus, Inc** is also SAAS ERP providers in USA, also offering ERP based applications [11].

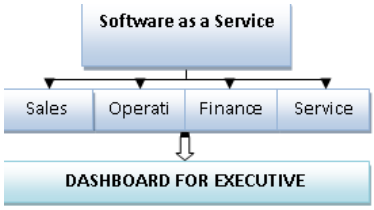

Fig. 3 Flow of Information and Business Process Integration

USER INTERFACE

Interface of application play an important role for the adoptability and efficiency of the application. The interface describes the function between the things, this term related to engineering technology used to describe the equipment, components and components connections [20], [21]. User satisfaction is one evaluation mechanism for gauging system success. There is need to evaluate, the efficacy of user characteristics and fitness factors as determinants of ERP success [22]. The technological products always relied upon the User Interface Design (UID) to elevate their complexity and usability. Technology its self may not win user acceptance and satisfaction. The usability, and user experiences on the end product, is the key to acceptance / satisfaction. Engineer's always focus on the technology aspects while the usability specialists focus on the interface at which user interact. When applied to computer software and web based applications, User Interface Design is known as Human-Computer Interaction (HCI).

Interface Design in terms of computers refers to many products where the application user's interacts with controls / displays. The best user interface designing always requires the systematic approach and to ensure optimum performance, usability Testing is required for evaluations. This empirical testing / investigations permit the application users to provide data that use to design optimized interface. [23]

FINDINGS

The purposed concept of computing is derived from the real world service model to give out the processing time to SMEs in textile sector to mange their business processes individually. So this requires the deployment of datacenter and storage which must be in control of government and at a place where the uninterrupted power supplies i.e. electricity or solar panel are available. SMEs can freely access the desired business applications accordingly. Here the focus is on the cloud based services oriented infrastructure (SAAS Based ERP) that will not only facilitate the SMEs to manage their business activities, but also to develop fastest supply chain with smooth flow of information between different cluster of SMEs where they exist demographically at different locations.

The division of this service oriented model for E-government into three levels as given in **figure.4** First part is to manage the business resources and transaction individually, in second to make collaboration between business to business (B2B) in different cluster of SMEs. The third phase to provide the service oriented architecture (SAAS Based ERP) with uniform graphic interface based applications (UUGI) for better understanding, memorability and adoptability as discuss later.

The Web Based ERP possesses tremendous potential to meet the above mentioned challenges as its goals to obtain better resources, utilization of ES capabilities and also to provide the cost effective services. It will help to produce a valuable product or services with concrete flow of work, material, and information. The informational/ functional integration and collaboration within the different clusters of SMEs facilitate them in planning, which involves demand forecasting, level of inventory, manufacturing and production planning. This level of integration between the different clusters of SMEs in textile value chains makes fastest the supply chain process to reduce the emission of carbon. It can also raise the utilization rate of resource and reducing the electricity cost and consumption as Pakistani SMEs facing now a days.

This will help to resolve the biggest issue in Pakistani textile sector, that is the workers as well as entrepreneurs are not very much familiar

with software and computer based applications. It is also costly for the entrepreneurs to spend time and money for training. Web based ERP with uniform graphic interface will enhance the workers adaptability, memorability and thy can work consistently. Application with single graphic Interface could also reduces the human mistake and builds confidence in them

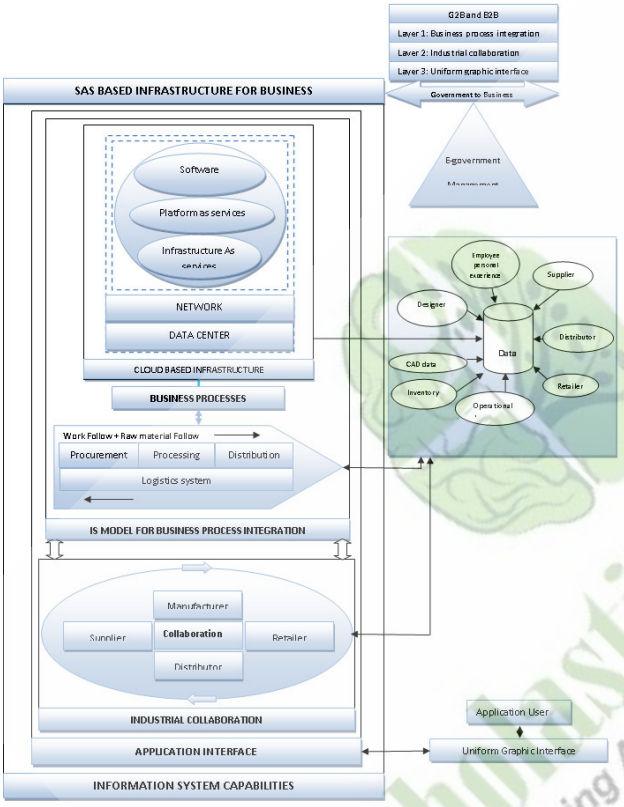

Fig. 4: Conceptual Diagram for SAS based ERP to Support Textile Sector

CONCLUSION

This paper discusses how to make an organizational process and information centric with cloud based application. It suggests to the government to offer such application to entrepreneurs so they can reduce their operational cost. To develop this cloud computing infrastructure there are high prioritiy needs i.e. complete support of Government authorities and the support of the autonomous bodies that are directly responsible for the development of SMEs in Pakistan. Pakistan is a developing country where no any organization is ready to take the initiatives to promote the awareness and capabilities of information technologies in entrepreneurs. This way government can supply the business communities with enterprise application via cloud computing and can raise the utilization of data center considerably to reduce the consumption of energy. Therefore, cloud computing is the best Environment to establish the e-government The Ministry of Industries, commerce, science and technology, and the **S**mall and **M**edium **E**nterprise **D**evelopment **A**uthority (SMEDA). The authors have recommended that there should be some actions taken by the government officials to regulate, promote and to create cloud computing environment for textile SMEs in Pakistan.

REFERENCES

i. Lizhe Wang, Jie Tao, Marcel Kunze "Scientific Cloud Computing: Early Definition and Experience", Proceedings of the 2008 10th IEEE International Conference on High Performance Computing and Communications - Volume 00 Karlsruhe, Germany, pp. 825- 830, 2008.
ii. H, Steve, "Cloud computing made clear", Business Week, Issue 4082, pp.59-59, May, 2008.
iii. B. Hayes, "Cloud computing", Communications of the ACM, Vol. 51 no, pp.9-11, May, 2008.
iv. A. Weiss, "Computing in the Clouds", networker, vol. 11, no. 4, p.18, Dec, 2007.
v. R. Buyya, A. Sulistio, "Service and Utility Oriented Distributed Computing Systems: Challenges and Opportunities for Modeling and Simulation Communities", Simulation Symposium, pp. 68-81, 2008.
vi. Geva Perry, "How Cloud & Utility Computing Are Different, at GigaOm." [Online] [Cited Nov 21, 2008] Available: http://gigaom.com/2008/02/28/how-cloud-utilitycomputing-are-different.
vii. Small & Medium Enterprises Department State Bank of Pakistan, SME Finance Quarterly Review First Quarter, 2008
viii. http://www.smeda.org/ SMEDA, Small and Medium Enterprise Authority
ix. Chaudhry Muhammad Nadeem Faisal, Muhammad Sheraz Arshad Malik "Usability evaluation of Software as Service from Individuals perspective" Vol. II No. 7 (March 2011). ISSN: 1697-9613 (print) - 1887-3022 (online). www.eminds.uniovi.es
x. BScaler enterprise recourse Manager, available online at: http://www.bscaler.com/ retrieved (02-02-2011)
xi. B Scaler, available online at: http://www.bscaler.com/saasplus/index_saasplus.htm retrieved (02-02-2011)
xii. Chaudhry Muhammad Nadeem Faisal, Issues in Cloud Computing: Usability evaluation of Cloud based application,

LAP LAMBERT Academic Publishing, Germany, ISBN-10: 3838362829, ISBN-13: 978-3838362823, PP, 34.

xiii. http://www.w3.or~R/2004/NOTE-ws-arch-2004021 I /

xiv. Weihong Li, Lifang Peng, Upgrade ERP from C/S to B/S Based on Web Service, 0-7803-8971-9/05/$20.00 02005 IEEE

xv. Evan Asfoura, the Classification of Business Model for the Exchange of Distributed Components of Federated ERP Systems on the Basis of Web Services,

xvi. Holsapple, Clyde W., Wang, Yu-Min and Wu, Jen-Her (2005): Empirically Testing User Characteristics and Fitness Factors in Enterprise Resource Planning Success. In International Journal of Human-Computer Interaction, 19 (3) pp. 325-342

xvii. Li Hong1, Ye Feng 2, The Applied Research of ERP in Logistics Management of Petroleum Company, 978-1-4244-7330-4/10/$26.00 ©2010 IEEE 49

xviii. Qing Chen, Yang Wang, Enterprise Collaborative Business Systems Based on Web Services Technology, 2010 International Conference on E-Business and E- government, 978-0-7695-3997-3/10 $26.00 © 2010 IEEE, DOI 10.1109/ICEE.2010.16

xix. http://cloudcomputing.sys-con.com/node/1200642

xx. Brockhoff K, Hauschildt J. Schnittstellen managementkoordination ohne Hierarchie , Zeitschrift Fuehrung und Organisation, 1993,6 (2): 396-403S

xxi. Renping Xu1, Interface Management for Industrial Design, 978-1-4244-5268-2/09/$25.00 ©2009 IEEE

xxii. Holsapple, Clyde W., Wang, Yu-Min and Wu, Jen-Her (2005): Empirically Testing User Characteristics and Fitness Factors in Enterprise Resource Planning Success. In International Journal of Human-Computer Interaction, 19 (3) pp. 325-342

xxiii. http://www.usernomics.com/user-interface-design.html

The Different Perspective of Managerial and Operational Level toward CRM Practice in Thailand

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ABSTRACT

Nowadays, Customer Relationship Management (CRM) has become the important part of business due to the benefit of analyze sale opportunities, campaigns management, personalization to each individual customer, cross-selling and up-selling. It also supports the organization to increase in the level of customer relationships, customer satisfaction, efficiency, effectiveness of its internal processes and higher revenue. Through these advantages a lot of organizations try to invest and put their effort in CRM practice. Unfortunately, many research evidence shows that most of the companies fail to make their CRM effort to pay off. Thus success CRM is required co-operate from the management top down in the CRM installed companies but there is no commonly agreed framework for the effective CRM's implementation and CRM's influential factors toward the managerial and operational perspective. Therefore this study will fulfill the gap and highlight the different influential factors. The finding has shown that each part of the organization has to take care for their role and responsibility in order to success in CRM practice.

KEYWORDS

CRM	Influential Factor
Perspective, Thailand	CRM Practice

PREAMBLE

Nowadays, Customer Relationship Management (CRM) has become the important part of business, especially large business organizations while the small and medium sized companies are increasing the interest due to the benefit of analyze sale opportunities, campaigns management, personalization to each individual customer, cross-selling and up-selling (Greenberg, 2010). CRM can also support the organization to increase in the level of customer relationships, customer satisfaction, efficiency, effectiveness of its internal processes and higher revenue (Valsecchi, Renga, Rangone, 2007).

The concept of CRM is not only another information tool, if the organization applied properly, CRM can yield an exceptional return in revenue and improve customer service (Nguyen, Sherif & Newby, 2007). Support from the study of Kimiloglu and Zarali (2009) has shown the finding on 72 businesses in Turkey that the organization who success in adopt CRM practice in their organizations have the significantly improvement on speed, effectiveness, reliability of their business process, customer satisfaction, revenue, brand image, efficiently business process, and technology utilization (Kimiloglu & Zarali, 2009).

With these advantages, the total worldwide Customer Relationship Management (CRM) software market reported by the AMR Research and Gartner had been exceeded to $13 Billion (USD) in the year 2008 (Bull & Adam, 2010) and will likely to reach $22 billion in the year 2012 with 36 percent growth rate (Greenberg, 2010). Unfortunately over 1,700 companies worldwide have been surveyed, the results show that only 16.1% of the Customer Relationship Management practice companies are reporting that CRM system usage is resulting in increased revenues in the their companies while the majority of firms or 83.9% are underutilizing the CRM tools they have in place (Dickie, 2009).

In Thailand, the National Statistical Office showed that there are only 20.7% of the total companies established in Thailand who gain benefit by adopt the Information and Communication Technology while 79.3% of the companies are lost or have the same revenue by adopt Information and Communication Technology (ICT), the important barriers of ICT practice in Thailand are expenditure too high, technology is too complicated, existing personal reluctant to use, lack of skills, difficult to recruit qualified personal and security concerns (National Statistical Office of Thailand, 2007). It was conforming to the study of Aruthari (2005) who study in Information Technology adoption by companies in Thailand showed the findings that, the barrier to adopt CRM practice consist of the following factors which are lacks of perceive benefit of CRM system, lack of adequate funding, lack of adequate personnel resource and resistant to new technology (Aruthari, 2005).

REVIEW OF LITERATURE

Before implementing CRM, organization has to evaluate the fit of CRM in their organization, current CRM capabilities and good reason to implementing CRM, together with the good implementing strategy (Nguyen, Sherif & Newby, 2007). Where the finding from the study of Light (2003) who interview 24 users and managers about the organizational CRM software experience showed that organization should understand the theoretical and practical implication of organization's CRM perspective before implementing the CRM system, the lack of understanding will likely to create the problem to CRM installed companies. Support from the study of Chahal (2009) who studied in operational and analytical CRM of healthcare services has shown the finding that mindset change is the key to build the competitive interest in employees and make them understanding their role to increase loyalty and customer satisfaction.

However, CRM is a concept that requires suitable business process, effective system integration, evaluation process (Zineldin, 2006) and CRM feedback which able to increases organization CRM's efficiency (Palsinghtoor, 2009), where the business processes which adapt to support CRM practice can enable the companies to increase the relationship between employee, customer and supplier by creating a good environment for operate business (Skrinja, Vuksic, Stemberger, 2008). The study of

Palanisamy, Verville, Bernadas & Taskin (2010) has shown the finding on interview 183 samples of organizations in North America, that CRM performance, strategy, business process reengineering, management support and end user buy-in are the influential factor to CRM system acquisition. Therefore, CRM success is required the change in organizational normal business process to support the CRM system which design the path way to best practice, together with the high level of employees' commitment (Shum, Bove & Auh, 2008), a clear CRM vision, management support, end-user involvement, suitable corporate culture and focus of user requirement, these success factor can be applicable both large, medium and small sized of CRM installed companies (Xevelonakis, 2005; Doom, Milis, Poelmans & Bloemen, 2010; Lambert, 2010). Also support from the study of Ifinedo (2008), 62 managements of 44 firms located in Finland and Estonia has agreed that the top management support and business vision are significant related to the level of CRM system success. Another support from the study of Dimitriadis and Stevens (2008) who suggested the effective CRM required the integrated perspective and coordination among all components which are strategy (a clear company's vision related CRM and adequate management commitment), organizational (align business process and customer-centric culture), human (CRM consciousness and mindset) and technology (integrated data and quality).

The study from Ranjan and Bhatnagar (2009) suggested the successful implementation of CRM in organization depends on employees' interest and ready to accept change to the new system, moreover new CRM system has to be flexibility, maintainable, reliable and consistent enough to support necessary change suggested by the management and organization. Moreover, Information Technology infrastructure has positive and significant relationship to the customer responsiveness which leads to the business advantage to the companies (Bhatt & Emdad, 2010).

Where the finding form the study of Chang, Lie and Fan (2010) in 87 samples of top four real tate brokerage companies in Taiwan showed that employees' computer self- efficacy which increased by adequate support and training, can make the CRM user efficiently deal with the problem and increase their usage of CRM system.

The study of Limsarun and Pacapol (2010) who studied in the CRM practice of ICT public listed companies in Thailand, has shown the finding on managerial perspectives that the executives believe individual level of computer self-efficacy, IT and Business culture gap, organizational CRM mindset, and CRM Software Utilization are the influential factors to the success of CRM practice (Limsarun & Pacapol, 2010). In contrast, most of the managerial works are focus on decision making, communication, coordination, disseminate information and motivate the people in the organization (Pearson & Chatterjee, 2003).

Thus, the perspective of managerial and operational level towards the CRM influential factor is likely to differ according to the job title and roles in organization (Palanisamy, Verville, Bernadas & Taskin, 2010) and there is no commonly agreed framework for the effective CRM's implementation and CRM's influential factors (Lo, Stalcup & Lee, 2010) as shown in the Table1. Therefore, the purpose of this study is to investigate and highlight the different perspective of managerial and operational level toward CRM practice companies in Thailand.

Influential Factor toward (CRM) success	Authors/References
• Individual's ability to use Customer Relationship Management System (Computer Self-Efficacy)	Chang, Lie & Fan, 2010; Limsarun & Anurit, 2010
• Level of information sharing, data security and performance of Customer Relationship Management System (CRM System Utilization)	Ranjan & Bhatnagar, 2009; Bhatt & Emdad, 2010;
• Employee's perception toward the benefit and important of Customer Relationship Management System (Employee's CRM Mindset)	Dimitriadis & Stevens, 2008; Chahal, 2009
• Organization's perception toward the benefit and important of Customer Relationship Management System (Organization's CRM Mindset)	Light, 2003; Aruthari, 2005;
• The different between believe, attitude and way to conduct job of Information Technology and Business Culture in Organization (Organization IT and Business Culture Gap)	Doom, Milis, Poelmans and Bloemen, 2010
• The change in business process to support Customer Relationship Management System (Business Process Change Management)	Shum, Bove & Auh, 2008; Skrinja, Vuksic, Stemberger, 2008
• Clear vision of management toward the Customer Relationship Management System (Management Vision)	Xevelonakis, 2005; Ifinedo, 2008
• Co-operate within organization to use the Customer Relationship Management System (Employee Buy-In)	Palanisamy, Verville, Bernadas & Taskin, 2010
• Support from the management in term of tangible and intangible resources to support Customer Relationship Management System (Management Support)	Lambert, 2010
• Evaluation process after implement Customer Relationship Management System (CRM Evaluation Process)	Zineldin, 2006; Palsinghtoor, 2009

Table 1: Influential Factors toward Customer Relationship Management System (CRM)

RESEARCH OBJECTIVES

- To provide a guideline and highlight key success factors for CRM practice companies.
- The finding of this paper could create a greater awareness on the perspective gap between managerial and operational level, since CRM success has to be initiated by the management top down (Xevelonakis, 2005).

RESEARCH METHODOLOGY

In order to find the perspective gap between managerial and operational level toward the CRM practice of CRM installed companies in Thailand, the qualitative approach was applied because it take the researchers to closer and understand people's beliefs and theoretical model for how they perceived and organize their life activity and routines in subjective meaningful ways and generating rich information for deeper understandings of their experience (Lieber, 2009). Both the primary data and secondary data were used.

The primary data were collected by techniques including formal and informal interviews and direct observations by the researchers. While the secondary data were firstly accessed from recent reports, journals, online resources and others, which were useful in informing the primary data collection process, and were also used to interrogate the findings.

Non-probability sampling procedure is adapted by the judgment sample which the researchers actively select the most productive sample to answer the research questions. The participants are working in the operational level and they were selected from the CRM installed companies in Thailand who more than one year in their organization because return on investment study must be done at least a year after the system has been implemented. This is necessary in order to have enough time to identify the true saving and costs (Tanoury and Pease, 2002; Ingevaldson, 2009).

With the purposive, convenience and snowball technique, the researchers contacted to the 86 samples who work in the operational level of CRM installed companies, while 22 persons or 25.58 percents give the permission to interview individually. All informants (22 females and 9 males) were selected from several departments which are MIS, Marketing, Sale and Customer Service of CRM installed companies which have employees range from less than 100 to more than 500 employees in their organization.

While the participants are experiencing and working related to the CRM system in their organization range from 1 year to more than 5 years as shown in Table 2. The researchers believe all the participants selected interviewees were knowledgeable, highly

experienced. As a result, the selected techniques were considered to be useful and suitable for empirical study.

The sampling design for the qualitative study started with an identification of sampling units who work in the operational level and sampling organizations which are the CRM installed companies in Thailand, Initially, the targeted units were purposely contacted through mail official letter requesting to the collect the data in relevant to the CRM areas in the concerned organizations. The official letters and guidelines of required information were enclose together in order to make understanding about the interview objectives and information which will be collected and recorded by the researchers. Each in-depth took around 30-40 minutes in each subject according to the availability of the informants. The semi-structured survey questionnaires which were not frame into any particular model; but the interviewees were interacted and questioned within the scope of this study.

The interviewed guideline had been prepared proved by the thesis advisor before the interview took place in order to make appropriate questions for the target groups. Also the interviews are designed by the researchers to direct both the content and focus of the interview. By asking specifically worded questions in a predetermined order, the researchers ensure a certain level of consistency when conducting the interviews.

The interviewees were encouraged to share the opinions and perspective towards a CRM practice of their work environment and organization. When the researchers having interview with participants. The Interesting quotes from the participants were recorded and analyzed by the researchers in order to highlight the important and different factors toward their perspective which related to the secondary data and previous studied. Before the end of interview, the researchers give the participants to rank 1 (the most important factor) to 10 (the least important factor) on the CRM influential factors toward their perspective. Afterward the result of ranking will be calculated to find the average, thus the lowest average is the most important factor to the CRM success.

Table 2: Participant's Profile

Category	Frequency	Percentage
Department		
Management Information System	9	40.91%
Marketing	4	18.18%
Sale and Distribution	4	18.18%
Customer Service and support	5	22.73%
Number of Employees in organization		
Less than 100	5	22.73%
100-200	7	31.82%
201-500	3	13.63%
More than 500	7	31.82%
Year of CRM experience		
Less than 1 year	4	18.18%
1-5 Year	8	36.36%
More than 5 year	10	45.46%

ANALYSIS AND INTERPRETATION

The result from this study showed that operational levels believe management vision, level of co-operate within the organization (Employee Buy-in) and management support are the most important factor to the success of CRM practice. While IT and Business Culture Gap and CRM Evaluation Process seem to be less important to their perspective toward CRM practice. As shown in Table3.

Table 3: The operational perspective toward CRM practice

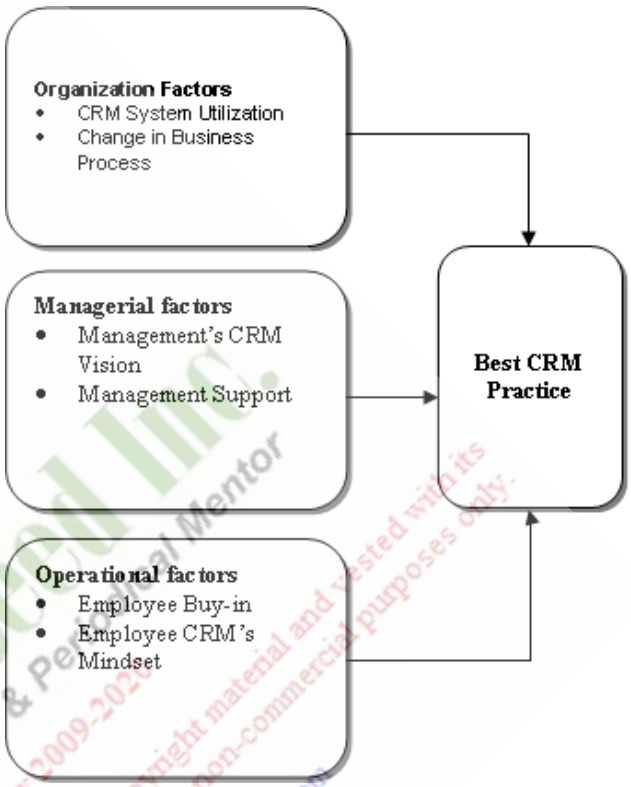
Influential Factors	Total Score	Average
Management Vision	69	3.1364
Employee Buy-in	104	4.7273
Management Support	104	4.7273
Organization's CRM Mindset	106	4.8182
Employee's CRM Mindset	109	4.9545
CRM System Utilization	110	5.0000
Change in Business Process	120	5.4545
Computer Self-Efficacy	130	5.9091
IT and Business Culture Gap	173	7.8636
CRM Evaluation Process	185	8.4091

FINDING AND DISCUSSION

The result of the study is very interesting while the managerial level believes IT and Business culture gap, computer self-efficacy, CRM system utilization and organization's CRM mindset are the most important factors to the success of the CRM practice. In contrast, IT and Business culture gap and computer self-efficacy seem to be the less important factors and far distinct in the operation level perspective, while the management support and vision are the most important. Since the success of the CRM practice has to be initiated by the management top down (Xevelonakis, 2005).

Therefore, the researchers have concluded that the important factors should come from the CRM common understanding of both managerial level and operation level as shown in Figure 1. Firstly, the managerial level should focus on the clearly vision and fully support to the CRM practice. Secondly, the operational level should focus in the level of co-operate within organization and positive perception to CRM practice. Thirdly, the CRM practice organization should utilize their CRM in place system and change their business to support CRM system.

Figure 1: CRM Best Practice Model



LIMITATION OF THE STUDY

It is clear that this study was somewhat biased in terms of obtaining access to the targeted samples for in-depth interview due to the policies to share information to outsider. Also it took a long time to contact the participants and follow up for the permission to interview.

CONCLUSION

Since the objective of this study is to provide a guideline and highlight the different perspective between the managerial and operational toward the CRM practice companies. The result have shown a very strong support that each level has a significant different perspective, therefore organization should focus more on communication within organization in order to spread a clear and concise information, together with a support to each individual's

requirement. Moreover the organization may have training to support and shape the mindset both for managerial and operational level, thus it will likely to improve the success rate of CRM practice.

FUTURE WORK

For the further study, the researcher looking forward to have quantitative research in Information and Communication (ICT) public listed companies in Thailand in order to concrete the conceptual framework and highlight the most important success factor to CRM practice, we use ICT sector as a model to study, the researcher thus it will able to apply for other sector who already installed CRM in their organization.

REFERENCES

i. Arunthari, S. (2005). *Information Technology adoption by companies in Thailand: a study of Enterprise Resource Planning System usage.* (Doctoral dissertation, University of Wollongong, 2005. Retrieved August 9, 2009, from http://ro.uow.edu.au/theses/338

ii. Bhatt, G.D. & Emdad, A.F. (2010). An empirical examination of the relationship between information technology (IT) infrastructure, customer focus, and business advantages. *Journal of Systems and Information Technology, 12* (1), 4-16. doi: 10.1108/13287261011032625

iii. Bull, C. & Adam, A. (2010). Customer Relationship Management Information Systems (CRM-IS) and the realization of moral agency. *Journal of Information, Communication & Ethics in Society, 8*(2), 164-177.

iv. Chahal, H. (2010). Two component customer relationship management model for health care services. *Managing Service Quality, 20*(4), 343-365.

v. Chang, K.C., Lie, T. & Fan, M.L. (2010). The impact of organizational intervention on system usage extent. *Industrial Management & Data System, 110*(4), 532-549.

vi. Dickie, J. (2009). 2009-Era Sales Needs 2009-Era CRM. *Customer Relationship Management, 13*(3), 8.

vii. Doom, C., Milis, K., Poelmans, S. and Bloemen E. (2010). Critacal success factor for ERP implementations in Belgium SMEs. *Journal of Enterprise Information Management, 23*(3), 378-40.

viii. Greenberg, P. (2010). The impact of CRM 2.0 on customer insight. *Journal of Business & Industrial Marketing, 25*(6), 410-419.

ix. Ifinedo, P. (2008). Impacts of business vision, top management support, and external expertise on ERP success. *Business Process Management Journal, 14*(4), 551-568.

x. Ingevaldson, P. (2009). Dazzle Your CEO With Hard Facts. *Computerworld, 43*(22), 40.

xi. Kimiloglu, H. & Zarali, H. (2009). What signifies success in e-CRM? *Marketing Intelligence & Planning, 27*(2), 246-267.

xii. Lambert, D.M. (2010). Customer Relationship Management as a business process. *Journal of Business & Industrial Marketing, 25*(1), 4-17.

xiii. Lieber, E. (2009). Mixing Qualitative and Quantitative Mehod: Insight into Design and Analysis Issue. (Lithuanian). *Journal of Ethnographic & Qualitative Research, 3*(4), 218-227.

xiv. Light, B. (2003). CRM packaged software: A study of organization experiences. Business Process Management Journal, 9(5), 603-616.

xv. Limsarun, T. & Anurit, P. The Customer Relationship Management practice of Information and Communication Technology public listed companies in Thailand. *Journal of Alternative Perspective of Social Sciences, 2*(Special Issue 2), 54-83.

xvi. Lo, A.S., Stalcup, L.D. & Lee A. (2010). Customer Relationship Management for hotels in Hong Kong. International Journal of Contemporary Hospitality Management, 22(2), 139-159.

xvii. National Statistical office of Thailand (2007). *Information and Communication Technology survey (Establishment).* Retrieved September 30, 2010, from http://service.nso.go.th/nso/nso_center/project/search_center/23project-th.

xviii. Nguyen, T., Sherif, J. & Newby, M. (2007). Strategies for successful CRM implementation. *Information Management & Computer Security, 15*(2), 102-115.

xix. Palanisamy, R., Verville, J., Bernadas, C. & Taskin, N. (2010). An empirical study on the influences on the acquisition of enterprise software decisions: A practitioner's perspective. *Journal of Enterprise Information Management, 23*(5), 610-639.

xx. Palsinghtoor, T. (2009). Creating competitive edge through improved customer relationship management. *Business Strategy Series, 10*(1), 55-60.

xxi. Pearson, C. & Chatterjee, S. (2003). Managerial work roles in Asia: An empirical study of Mintzberg's role formulation in four Asian countries. *Journal of Management Development, 22*(8), 694-707. DOI 10.1108/02621710310487864.

xxii. Ranjan, J. & Bhatnagar, V. (2009). Principles for successful aCRM in Organizations. *Direct Marketing: An International Journal*, *2*(4), 239-247.

xxiii. Shum, P., Bove, L. & Auh, S. (2008). Employees' affective commitment to change: The key to success CRM implementation. European *Journal of Marketing*, *42*(11/12), 1346-1371.

xxiv. Skrinja, R., Vuksic,V.B. & Stemberger, M.I. (2008). The impact of business process orientation on financial and non-financial performance. *Business Process Management Journal*, *14*(5), 738-754.

xxv. Tanoury, D. & Pease, J. (2002). Back in black: Understanding the financial impact of CRM. *Customer Inter@ction Solutions*, *21*(5), 38-43.

xxvi. Valsecchi, M., Renga, F.M., Rangone, A. (2007). Mobile customer relationship management: an exploratory analysis of Italian applications. *Business Process Management Journal*, *13*(6), 755-770.

xxvii. Xevelonakis, E. (2005). Developing retention strategies based on customer profitability in telecommunications: An empirical study. *Journal of Database Marketing & Customer Strategy Management*, *12*(3), 226-242.

xxviii. Zineldin, M. (2006). The royalty of loyalty; CRM, quality and retention. *Journal of Consumer Marketing*, *23*(7), 430-437.

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A STUDY OF ISSUES & CHALLENGES AFFECTING ERP IMPLEMENTATION IN SMES

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ABSTRACT

Companies implement ERP systems to integrate the business processes of a company, and help organizations obtain a competitive advantage. Enterprise Resource Planning (ERP) is one of the solutions for the Small and Medium Enterprises (SMEs) in order to face the global challenges. This paper attempts to explore and identify issues affecting Enterprise Resource Planning (ERP) implementation in context to Indian Small and Medium Enterprises (SMEs) and challenges in front of SMEs. This paper attempts to highlight those specific issues where a different factors needs to be addressed while implementing the ERP system in this the four issues are proved to be crucial for SMEs such as proper system implementation, clearly defined scope of implementation procedure, proper project planning and minimal customization of the system selected for implementation.

KEYWORD

Enterprise Resource Planning[ERP]	Small and Medium Enterprises
Implementation	Business

PREAMBLE

An ERP implementation takes many years to complete and requires a large amount of IT investment and their effectiveness is hard to evaluate. Today organizations of any magnitude have implemented or in the process of implementing Enterprise Resource Planning (ERP) in order to reap the benefits of integration and to remain competitive in the market. It has also been noted the dispersion of ERP systems in large and small-medium scale enterprises (SME) has been, by large, the most pertinent phenomenon since nineties in the sector of the business processes of a company, and help organizations Information technology (IT). All the Companies implement ERP systems to integrate obtain a competitive advantage and high productivity of the employees gives to the company competitive advantage and increases the human capital. To achieve all of this, companies have realized the necessity to implement ERP software to achieve integration of business activities. ERP systems can also be an instrument for transforming functional organizations into process-oriented ones. When properly integrated, ERP supports process-oriented businesses effectively [i](Al-Mashari, 2003). It is argued that 65% of managers believe ERP project failure will damage a firm. The complexity of ERP, high costs and implementation problems force numerous organizations to reconsider their new plans in relation to this enterprise system [ii](Kumar and Hillegersberg, 2000). Although ERP applications constitute well – structured, reliable information technology (IT) backbones of fortune 500 companies worldwide [iii](Hofmann,P, 2008). A recent study finds SME companies focusing on growth strategies and customer services sometimes balancing between the two, but more often focusing exclusively on one or the other. As companies grow in size and improve performance, they are most likely to have invested in ERP system that will grow with them. As mid size companies grow, they must learn to operate in distributed environment and often experience proliferation of ERP and other enterprise applications. A number of publications have highlighted the failures and the frustrations that enterprises go through in implementing ERP systems. A Gartner group study was carried out in 1300 European and American companies and being found that 32% of ERP projects were delivered late and thus unable to achieve the true benefits of implementation. Also by doing comparative analysis between the identified issues for companies in NCR Some issues are proved to be crucial for small companies but not for large enterprises such as proper system implementation strategy, clearly defined scope of implementation procedure, proper project planning and minimal customization of the system selected for implementation, because of some limitations faced by the small companies as compared to large enterprises._Such a scenario raises some serious questions: Are IT Companies informational needs as well as other issues are different from that of large IT Companies? Is it possible to identify a relationship between organizational climate and ERP adoption in companies of different size? Can certain factors or issues be identified that can be considered critical in context to Small Companies but not for large organizations so that managers can focus on those key issues to make the implementation process smooth? ERP implementations usually involve broad organizational transformation processes, with significant implications on the organization's management model, structure, management style and culture, and particularly, on people [iv](Caldas & Wood, 1999).

SIGNIFICANCE & SCOPE OF THE STUDY

To Explores and validates the existing literature to find out the critical success factors that lead to the success of ERP in Indian companies. The findings of the results provide valuable insights for the researchers and practitioners who are interested in implementing Enterprise Resource Planning systems, how best they can utilize their limited resources and to pay adequate attention to those factors that are most likely to have an impact upon the implementation of the ERP system. ERP systems provide firms with two new and different types of functionality: a transaction processing function, allowing for the integrated management of data throughout the entire company, and a workflow management function controlling the numerous process flows within the company. ERP facilitates the flow of information between all the processes in an

organization. ERP systems can also be an instrument for transforming functional organizations into process-oriented ones. When properly integrated, ERP supports process-oriented businesses effectively

OBJECTIVE OF THE STUDY

The Implementation of new technologies and manufacturing philosophies in industrial sector with good success rates is crucial in a nation's economic growth and prosperity. ERP is one such system for which a lot of resistance is offered in organizations for implementation due to higher investments and more failures associated with it. The study of ERP implementation issues is necessary to encourage and persuade small and medium scale industries to go for ERP implementation as ERP is vital in their future growth. The objective of this paper is identified and validates the critical success factors for ensuring successful implementation of Enterprise Resource Planning (ERP) packages in companies.

- To analyze the Implementation of ERP and IT industries in India.
- To identify the factors, issues &challenges in ERP Implementation.

LITERATURE REVIEW

ERP implementation issues are necessary to encourage. Therefore, various aspects of ERP implementation have attracted the attention of academicians, researchers and policymakers from time to time in the country. The literature reviews are:-

ERP implementations usually involve broad organizational transformation processes, with significant implications on the organization's management model, structure, management style and culture, and particularly, on people [v](Caldas & Wood, 1999). AMR research Inc., the leading industry and market analysis organization specializing in enterprise enabling technologies, predicts that the enterprise resource planning (ERP) software market will grow at a compound annual growth rate of 37 % over the next five years [vi](Caruso 1998). This market will continue to be one of the largest, fastest growing, and most influential in the applications industry, and is poised for steady growth into the new millennium, says AMR. Before ERP came into existence, different departments had their own software system to meet their requirements. This resulted in a fragmentation of information, as all of the information was stored separately on different systems in business units, factories etc. sometimes spread across the world. This made it impossible to get accurate information on time. In 1990s, globalization led to immense competition and companies, especially in the manufacturing sector, realized the need for more customer focus and shortened product life cycles. Corporations had to move towards agile manufacturing, continuous improvement of business processes and business process reengineering. This required an integration of manufacturing with other functional areas like accounting, marketing, HR, etc. This led to the evolution of ERP systems. ERP combines all the business functions together into one single integrated system with a single central database as shown in figure-1. This system serves the information needs of all the departments across geographies, while allowing them to communicate with each other. As illustrated in fig-1, a typical ERP system consists of modules for manufacturing, Production Planning, Quality Management, Financial Management, Human Resource, Manufacturing and Logistics and Sales and Distribution. Once an enterprise wide implementation is in place, operating managers are relieved of routine decisions and they thus have the time to plan and execute long-term

decisions that are vital for the growth of an organization. It leads to significant cost savings as the health of the organization is continuously being monitored. Though the cost of an ERP system is very high, it becomes insignificant in the face of the benefits a proper ERP implementation provides in the long run (Sadagopan, 1999).Nowadays, the ERP industry is one of the most promising ones, which contrasts with the obvious lack of related academicals research In case of small and medium scale industries (SMI) of India the study revealed that for ensuring successful ERP implementation the six major factors on clarity in goals and objectives behind the implementation, adequacy of user training, competency of the project implementation team, acceptance of changes brought about by the implementation and adequate vendor support and external consultant participation had a key role to play. [vii](Parijat Upadhyay, 2008) Similar studies conducted in china by creating interactive structural model have identified four critical factors on the funds support, department‟s participation; training and service of the supplier of ERP which influence s the system of ERP implementation most directly. The four factors above are critical factors which decide the ERP system is successful or not [viii](Ranzhe Jing et al, 2007). According to Huin unless the differences between SME and large companies are clearly conceived, the ERP project will not reach to positive outcome [ix](Huin, S.F. 2004,) We believe that organizations and vendors should play an important role in researching on ERPs, because this kind of research is amenable to be field-based rather than laboratory-based. Consultants also play an important role in the research of some issues; over the years, they have accumulated probably the richest ERP experiences through thousands of ERP installations worldwide. The best practices for ERP implementation in SMEs are investigated by using a problem driven approach by dividing implementation process into several components which will reflect the nature of ERP projects and makes them distinctive from other systems design. Methods critical issues relating to developing entrepreneurship for sustainable development of SMEs for its future extensions and added benefits are also addressed [x](Rashmi Jha at el, 2004). Effective communication is critical to ERP implementation [xi](Falkowski et al., 1998). Expectations at every level need to be communicated. Management of communication, education and expectations are critical throughout the organization [xii](Wee, 2000).

The challenges in global ERP software implementation is studied .the challenges in implementation are identified as non uniform business practices in different countries, conflict of interests between various stake holders, Lack of experienced implementers in all countries, efficient uses of metanational advantages,. From this study it has been found that the benefits of ERP implementation are not same for all functions [xiii](Saumyendu Ghosh, 2002). Upadhyay and Dan made an attempt to identify those factors that the organizations must keep in mind so as to ensure positive outcome of successful implementation of the enterprise planning systems. Based on the responses received from the respondents their study reveals that for ensuring successful implementation following issues are considered immense importance namely, clarity in goals and objectives behind implementation, adequacy of user training, competency in project implementation team, acceptance of changes brought about by implementation and adequate vendor support and participation of external consultants [xiv](Chen, R. 2008) Vijaya Kumar et al. did a study to prioritize the issues affecting ERP system in medium scale fertilizer industry and the following factors were

determined: adequate and correct data, training and testing, never run parallel system, conference room pilot, employee retention, customization, and clarity in management objective, external consultant dependency [xv](Vijaya Kumar,2010) Further to this the researchers Upadhyay and Dan identified certain factors that have been found to be critical in context to implementation of IT projects. Seven factors have been identified that are found to be crucial are: Support from Top management, goals and objectives, user knowledge, project champion , project team competency, improve work efficiency, scalability & scope and ERP importance. Out of this the first two are considered as most important [xvi](Parijat Upadhyay, 2010). Through regular communication, working with change agents, leveraging corporate culture and identifying job aids for different users [xvii](Rosario, 2000). From the literature review it is evident that the success and failure factors for ERP implementation in companies is studied extensively and other implementation issues like the quality issues are not explored much and there is a vast scope for study in this area.

Specifically quality issues in ERP implementation are not explored in an Indian SME. Taking this into consideration the present study is aimed at analyzing quality issues in ERP implementation in Companies in NCR Region prioritizing the factors affecting ERP Implementation using a analytical model.

One third of ERP implementations worldwide fail owing to various factors [xviii](Sirigindi, 2000). One major factor for failure is considering ERP implementation to be a mere automation project instead of a project involving change management. It is a business solution rather than an IT solution, as is perceived by most organizations. Yet another reason for failure is over customization of the ERP system. Therefore, organizations need to very carefully go about their ERP implementations, if they are to be successful. Most large companies have either implemented ERP or are in the process of doing so. Several large companies in India, both in the public and private sectors, have successfully implemented ERP and are reaping the benefits. Some of them are Godrej, HLL, Mahindra & Mahindra and IOC. With the near saturation in the large enterprise market, ERP vendors are looking to tap the potential in the SME segment [xix](Davenport, 1999). The spending on ERP systems worldwide is increasing and is poised for growth in the next decade [xx](Yen et al., 2002). Some of the reasons for this are :

Vendors are continuously increasing the capabilities of their ERP system by adding additional functionality like Business Intelligence, Supply Chain, and CRM, etc. They have shifted to web-based ERP. The demand for web-based ERP will increase due to the perceived benefits of e-commerce. There are several markets that are yet unexplored. Pressure from larger counterparts due to globalization, SMEs today operates in a wider arena. Majority of them have MNCs as their clients. These MNCs require SMEs to implement the same ERP system as them to allow for tighter integration in their supply chain, which permits them to design and plan the production and delivery so as to reduce the turnaround time. Peer pressures considering the growth in ERP implementation in the SME segment, several SMEs are adopting ERP systems as their peers have done so and to gain competitive advantage and respond quickly to the dynamic market scenario. Thus SMEs would be able to increase their efficiency and productivity by implementing a suitable ERP system. The companies potential in India for the enterprise class is projected to be Rs. 728 crore ($160 million) 47% of the overall market [xxi](Munjal, 2006). ERP vendors like SAP,

Oracle, Microsoft, QAD etc. are all trying to increase their customer base in the SME segment and have products specifically designed to cater to the needs of SMEs. E-commerce benefit will accrue from the close integration between large enterprises and SMEs. Cheaper and faster Internet reduces the costs further. Cheaper hardware and software with the advances in technology, the costs of both hardware in the form of servers, cables, switches etc. and software like databases have come down (Gable et al, 1999). Human resource planning i.e. team composition. Top management commitment to release the right people for the implementation. These factors help organizations to understand their level of preparedness for an ERP implementation. Reduced Planning cycle time, Reduced manufacturing cycle time, Reduced inventory, Reduced error in ordering, Reduced requirement of manpower, Enables faster response to changing market situations, Better utilization of resources, Increased customer satisfaction, Enables global outreach.

ISSUES AND CHALLENGES

Though the market for ERP seems to be growing, there are several issues and challenges one has to contend with when implementing an ERP system in the SME segment. Some of these are:

1. **Awareness:** There is a low level of awareness amongst SMEs for ERP vendors, applications etc. most of the time they do not even know what ERP systems are and what they can do. They consider ERP systems to be a magic wand, which will help solve all their business problems, be it in terms of quality, or process defects. ERP brings in a more disciplined execution of business process giving more transparency and visibility to the working of the organization.

2. **Perception:** SMEs have the perception that ERP is meant only for large firms mainly owing to the high costs of acquisition, implementation and maintenance as also the complexity. Some of the SMEs even feel they do not need ERP.

3. **Earlier Implementations:** SMEs have heard of the much-publicized failures in ERP implementation, which have led firms to bankruptcy. Some SMEs who have implemented ERP earlier have failed. This has led SMEs to believe that ERP implementations are a waste of time and effort and can even lead to the demise of company.

4. **Approach to implementation:** ERP vendors advice SMEs to mould the business to ERP's way of working. Considering that ERP systems will bring it best business practices. This is the plain vanilla approach that was mentioned earlier, which would bring down the cost of implementation. But most SMEs have processes that they have evolved over time and hold very dear to their hearts.

As a result, SMEs are having the entire ERP system customized to meet their requirements. This would increase the overall cost of implementation. A good approach would be to keep the customization to a minimum.

5. **Cost:** SMEs have less of capital than their larger counterparts.

6. **Change management:** One of the major reasons why ERP implementations nationwide have been known to fail is due to the implementation being considered as an automation project instead of one that involves change management. This results in the system being put in place but not being used effectively due to people not ready to accept the change.

7. Limited resources: Most SMEs do not have an in-house IT team. Due to this they have to rely on external agencies to help them and this adds to the implementation costs.

FACTORS AFFECTING ERP IMPLEMENTATION

The major factors can be classified into four subheadings namely, the top management, training, the data collection & Software design and Testing. The 8 factors affecting the ERP implementation are determined. The consensus among the ERP team and top management is very important to indicate the need for application framework. The factors are can be illustrated as fallows-

1. Data provided: Adequate and correct data should be provided it had to be collected from the distributed Tally 7.0 Servers, had to be reconciled, mapped into the ERP System in its standard format and finally the data had to be uploaded into the system. A strong management direction is needed for the managers at each of the branches so that adequate and appropriate data is duly provided.

2. Parallel systems: When issues began to crop up after implementation of ERP in Finance module, sales and distribution module was completely ignored, they shifted work with these modules back to the old system. This hampered the proper integration of organization data and led to data mismatch in other modules as well. As a result, support system provided by the vendor became obsolete and difficult to implement. Hence, use of parallel systems should be avoided outright.

3. Training and testing: Training and testing of the system should be done properly by the ERP Consultants, that is, the vendor is provided as part of the implementation procedure to only a 30% group of people from the clients' side known as the Core Team. This core team in turn trains a rest of people who are actually responsible for day-to-day transactions called the End Users. It was observed that the 50% second leg of training which is provided to the end users was not carried out mainly due to lack of computer literacy, not will to accept the responsibility this triggered a strong resistance to change for the new system being installed and caused reduction in employee motivation.

4. Expectations from the ERP System: Clarity in management objectives and expectations from the ERP System are clearly stated to the vendors. This led to a belief of the systems' power to integrate the company actual functions. According to the vendor, management expected a quick return on investment which was not practical since it takes around three to four months to notice any significant returns. Hence, top management should be patient with the new system and any fear of failure should be done with for a successful running system.

5. Employee Retention: It was observed that after the completion of ERP training provided to the staff and within some days of the system going live, many of the trainees from the organization quit the company causing great losses to organization in the form of shortage of key resources i.e. trained staff. This was a big percentage of employee attrition rate and it is not possible for a company to hold back any of its employees even with the most stringent contract.

6. Design & Testing: is a very important part of software testing and should not be neglected the computer work stations are set up in a room to represent each of the major tasks of customer service /order entry, planning, goods-in, stores and finance. A simplified data set is loaded and the company operations run through. The data is gradually increased as first the project team, then managers and finally users get more familiar with the software. This is conducted

just before the ERP becomes fully functional in the organization.

7. **Customization should be less than 30%-** Customization Services involves any modifications or extensions that change how the out-of-the-box ERP system works. Customizing an ERP package can be very expensive and complicated. Some ERP packages have very generic features, such that customization occurs in most implementations. Customization work is usually undertaken as "changes requested beforehand" software development on a time and materials basis. But ideally, experts in the ERP implementation field have suggested that customization should be less than 30%. The level of customization in the case of Multiplex exceeded beyond this and posed a great deal of problems when key applications were run and found to be not working as they were intended to.

8. **Stakeholders shall be identified in the initial phase including customers and vendors:** Stakeholders are all those who are directly or indirectly affected by a company implementing any new ERP system be it organizations like those of the supplier as well as the vendors. A failure to identify the stakeholders gives the implementing company a major setback when the concerned people or organizations work against the new system. So identification of all stakeholders has to done in advance.

CONCLUSION

The commitment of top management has been recognized as one of the most important elements in the successful implementation of ERP system. Since the primary responsibility of top management is to provide sufficient financial support and adequate resources for building a successful system, Implementing an ERP package is a complex and costly undertaking, so it's essential to choose the appropriate vendor, adequate scalability features, suitability of H/W and user friendliness of product depending on the size and structure of an organization Project management related factors like Clear goal and objective, Effective project management, Reasonable expectation, Other dept. participation, Change request, Implementation strategy, Data conversion, Clear & effective communication are very critical for a successful ERP implementation. Team member should understand the inner workings of their respective departments thoroughly. And the team must have can do attitude.

In India, SMEs are the backbone of the economy and are today faced with global competition. Therefore it becomes imperative for them to look for means of responding to the dynamic markets. ERP systems have become the most common IT strategy for most large companies. SMEs too are moving towards ERP systems. They need to adopt a proactive approach towards ERP and consider it as a business solution rather than a mere IT solution.

REFERENCES

[i] Al-Mashari,M., Al-Mudimigh, A and Zairi, M.(2003),"Enterprise Resource planning: a taxonomy of critical factors ", European journal of perational research, Vol 146, pp. 352-64.

[ii] Kumar, K., and Hillegersberg, J. (2000). ERP experiences and evolution. Communications of the ACM, 43(4),23-26.

[iii] Hofmann,P, (2008). —ERP is Dead, Long Live ERP, Internet Computing, IEEE, August 2008, 12(4), pp. 84-88

[iv] Caldas Miguel P., Wood Thomaz Jr. (1999). How consultants can help organizations survive the ERP frenzy. Paper submitted to the Managerial consultation division (August 1999).

[v] Caldas Miguel P., Wood Thomaz Jr. (1999). How consultants can help organizations survive the ERP frenzy. Paper submitted to the Managerial consultation division (August 1999).

[vi] Caruso Dave (1998.) ERP vendors - AMR Research's Top 20 Roundup, the report on Enterprise Applications. AMR Research Inc., (Premiere issue 1998) p. 2.

[vii] Parijat Upadhyay et al , "An explorative study to identify the Critical Success Factors for ERP implementation in Indian small and medium scale enterprises", 978-0-7695-3513-5/08 $25.00 © 2008 IEEE, DOI 10.1109/ICIT.2008.66 pp 295-299

[viii] Ranzhe Jing et al, (2007) "A Study on Critical Success Factors in ERP Systems implementation", 1-4244-0885-7/07/$20.00 ©2007 IEEE.

[ix] Huin, S.F. (2004), ―Managing deployment of ERP systems in SMEs using multi-agents, International Journal of Project Management, Vol. 22 No. 6, pp. 511-17.

[x] Rashmi Jha, M. N. Hoda, A. K. Saini, " Implementing Best Practices in ERP for Small & Medium Enterprises", 978-1-4244-2972-1/08/$25.00 ©2008 IEEE.

[xi] Falkowski, G., Pedigo, P., Smith, B. and Swanson, D. (1998), ``A recipe for ERP success", Beyond Computing, pp. 44-5

[xii] Wee, S. (2000),"Juggling toward ERP success: Keep key success factors high",ERP News.

[xiii] Saumyendu Ghosh (2002), " Challenges on global implementation of ERP software", IEE, 2002 9-7803-7385-5/02/$17.00©2002 IEEE pp 101 -106

[xiv] Chen, R., Sun, C., Helms, M.M.and Jih, W. (2008), "Role negotiation and interaction: an exploratory case study of the impact of management consultants on ERP system implementation in SMEs in Taiwan", Information Systems Management, Vol. 25 No.2, pp.159-73

[xv] Vijaya Kumar et al. (2010), ―Application of Analytical Hierarchy Process to Prioritize the Factors Affecting ERP Implementation‖, International Journal of Computer Applications (0975 – 8887) Volume 2 – No.2.

[xvi] Parijat Upadhyay et al , "An explorative study to identify the Critical Success Factors for ERP implementation in Indian small and medium scale enterprises", 978-0-7695-3513-5/08 $25.00 © 2008 IEEE, DOI 10.1109/ICIT.2008.66 pp 295-299

[xvii] Rosario, J.G.(2000) , " On the leading edge: Critical success factor in ERP implementation projects", Business world Philippines.

[xviii] Siriginidi S. R., (2000),"Enterprise Resource Planning in re-engineering business", *Business Process* Management Journal, Vol. 6 (5), pp. 376-91.

[xix] Davenport Thomas, (2000), "Mission Critical", Harvard Business Press.

[xx] Yen D. C., Chou D. C., Chang J., (2002),"A synergic analysis for Web-based enterprise resource planning systems", Computer Standards & Interfaces, Vol. 24 (4), pp 337-46.

[xxi] Munjal Shefali, (2006), "Small is beautiful: ERP for SMEs', http :// www.domainb.com/ infotech/ itfeature/20060601_beautiful.htm.

Global Journal of Enterprise Information System

Jan 2011- March 2011

Volume-3 Issue-I

A STUDY OF ISSUES & CHALLENGES AFFECTING ERP IMPLEMENTATION IN SMES

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ABSTRACT

Inventory flow management system provides framework for achieving goals of top-line management. India is going through FMCG revolution, all the big business houses are entering this sector like Field fresh (Air Tel), TATA with PepsiCo India etc. Our country also poses a big challenge to organized large FMCG companies particularly in beverages sector. A well managed inventory ensures that customers receive the products when they need them, in the quantities they need, and with the uniform high quality they expect. In this research paper, we have discussed the ways to manage the flow of inventory through the manufacturing and distribution system. Globalization, integration of the world economy and the concept of extended enterprise has led to an increasingly important role played by the entire inventory management system. The most important thing to an owner of business is to provide a quality product and service to the customers with effective utilization of Inventory flow management system. Inventory flow management allows the organizations to match the inventory levels to the customer demand, while meeting the other objectives such as capacity, productivity, and profitability. In a competitive business environment, inventory flow is therefore a critical part of business.

KEYWORD

Enterprise Resource Planning[ERP]	Small and Medium Enterprises
Implementation	Business

PREAMBLE

Today inventory flow management is one of the most challenging and expensive aspect of supply chain management. Companies are constantly balancing inventory carrying costs and obsolescence with customer fulfillment requirements. Retaining too much stock increases unnecessary warehousing costs, ties up valuable capital, and can expose vendors to significant financial losses if demand drops. With little or no insight to available upstream inventory, downstream manufacturers, distributors, and retailers cannot commit to large or rush orders with confidence and may even be not able to deliver on forecast.

Inventory management is a high dynamic system which is sensitive to cost parameters and has been evolving over the years. Inventory management, also known in the management parlance as supply chain management, refers to the control of material flow from the suppliers of raw materials on one hand, and delivery of the finished product to customers on the other hand.

Most of the inventory flow management techniques are based on scientific principles and assume prior knowledge of mathematical and probability theories. Inventory management takes into account other functions such as purchasing, production and marketing and its techniques aim at balancing out conflicting goals.

The inventory flow management system provides information to efficient manage the flow of materials, effectively utilize people and equipment, coordinate internal activities. A well managed inventory flow management that customers receive the products when they need them, in the quantities they need, and with the uniform high quality they expect. Inventory flow management allows the management team to match the inventory to customer demand, while meeting the systems objectives for capacity, productivity and profitability.

INVENTORY AND SKU'S

Before discussing how to achieve a strong inventory flow, let us first define several inventory terms. Inventory consists of four types of stock.

1. CYCLE STOCK: cycle stock is the amount of stock required to meet basic customer demand.
2. IN TRANSIT STOCK: In transit stock that is reroute between locations that carry inventory.
3. SPECULATIVE STOCK; speculative stock is the additional required to meet a higher than normal short term demand for the product.
4. SAFETY STOCK: safety stock is the quantity of stock in excess of cycle stock that is maintained to compensate for uncertainties in demand and replenishment. It may be expressed in fixed quantity or in days of coverage.

80:20 RULES

A basic guideline for inventory management is the 80:20 rules, sometimes called the Pareto analysis, after the man who first observed it. The rule states that 80 percent of items in stock account for only 20 percent of demand. Conversely, 20 percent of items account for 80 percent of demand. The 80:20 rules

are useful to determine inventory storage areas. Level A items the 20 percent of inventory items in greatest demand belong in the most convenient locations.

NEED FOR INVENTORY FLOW MANAGEMENT

The ideal inventory flow management system would perfectly match supply with demand and eliminating the need for inventory. Operating construction on manufacturing, transporting, and warehousing all create imbalances in the systems that result in the need for inventory. There are two points, generally to stress the need for inventory flow management in FMCG sector.

1. Errors in forecasting customer demand cause too much or too litter product to be produced at the plant.
2. Seasonal or promotional changes affect customer demand for product.

Inventory shortage also creates imbalances in the system. For instance, labor shortage, transportation shortage, shortage of raw supplies and manufacturing capacity constraints all contribute to inventory shortage and unfulfilled customer demand.

FMCG SECTOR SIZE AND TRENDS

- The Indian FMCG sector is an important contributor to the country's GDP
- It is the fourth largest sector in the economy and is responsible for 5%of the total factory employment in India.
- This has been due to liberalization, urbanization, increase in the disposable incomes and altered lifestyle.
- The overall middle income group accounts for over 60% of the sectors sales. Rural markets account for 56% of the total domestic FMCG demand.
- Total market size in excess of US $ 13.1 billion
- The FMCG sector has been registering double. Digit growth in sales since the last couple of years: currently, with annual revenues of US $ 14.74 billion, it is the one of the most promising sectors.
- The FMCG market is set to treble from US$ 11.6 billion in 2003 to US$ 33.4 billion in 2015
- The FMCG sector is witnessing rapid growth in rural areas and is estimated to grow by 40% compared to the growth of 25% in urban areas.
- PepsiCo has announced a US$ 500 million investment in India over the next three year's
- FMCG companies have acquired about 15 companies and have spread their presence in more than a dozen countries.

INDIAN FMCG MARKET SIZE (in US $ billions)

(Source: IBEF FMCG Analysis)

SCHEDULING PROBLEMS

One of the most frequent contributors to inventory shortages is scheduling. There are three types of scheduling problem of FMCG sector.

a) First, the schedule may be inadequate
b) Second. The schedule may not be properly carried out.
c) Third, the schedule may be disrupted by unpredictable events, such as bad weather or equipment breakdowns.

Effective inventory flow management will trade off conflicting operating and inventory constraints to achieve an effective compromise that maintains enough inventories to meet customer demand yet covers variation in the forecast.

THE COSTS OF INVENTORY

Inventory is clearly needed, but there are costs associated with it, and these costs increase as inventory levels increase, especially when both direct and indirect costs are considered. The larger the inventory, the greater the possibility of loss through damage, aging, obsolescence or theft and finally, the larger the inventory, the less efficient it is to handle. More time must be spent re-warehousing, double handling and rotating stock, using man-hours that might well have been used more effectively for some other task.

It is not uncommon in the beverage manufacturing industry for carrying costs to be as much as 25% of the total funds invested in inventories. This money tied up in inventory could be used elsewhere. So, an operation must carry sufficient inventory to keep out of stock or shortage situations to a minimum while costs associated with excess inventory.

BALANCING INVENTORY AND PRODUCTION REQUIREMENTS

The inventory flow management principle just presented assumes that the plant has ample production capacity and flexibility, and well as sufficient storage area. The amount of needed for planning and scheduling the receipt of raw materials, ingredients, and packaging supplies must be taken in to account when projecting finished goods requirement.

Certain demand patterns, seasonal swings and promotional activities may require pre production specific SKU's to avoid production capacity bottlenecks. However, when goods are pre-produced, there may not be enough storage capacity at the production facility. In these situations, the inventory may have to be shipped to the distribution centers based on forecasted demand. If the facility has too many capacity constraints or an unbalanced infrastructure, the management team may need to modify the basic inventory flow management principles to accommodate their situation.

MATERIALCONTROL IN THE FOOD AND BEVERAGE INDUSTRY

Organizations today are required to be more proactive in the manner of product recall. The business model of yesteryears demanded traceability from the distribution centers to the individual stores. In a recent survey of 48 companies in the food and beverage industry, the top reason for

installing an automated material tracking and control system is to gain real time inventory visibility and accuracy and to effectively track and trace inventory the survey reported that 52% of the companies currently use bar code labels to track raw materials, work in process and finished goods.

Controlling raw materials and finished goods inventory in real time is necessary in order to avoid the accidental movement of material. Working in a real time environment allows a company to place inventories instantaneously on hold at either the SKU real time inventory expiration or control can prevent the allocation of expired inventory from entering the processes or further down the distribution chain. In addition, transactional records such as employee, time ,line , location along, with many other attributes are automatically captured and logged providing the who, what, when, where and how of material flow.

Effectively managing the movements of materials throughout one is processing and distribution centers, and having the ability to react to rapidly changing business demands, require the right policies, procedures, and system. The marriage of technology and processes that are based on industry best practices is the key to an organizations success in meeting today's growing challenges.

PUSH AND PULL: TWO SYSTEMS OF INVENTORY FLOW MANAGEMENT

The goal of inventory flow management is to match supply with demand on a timely basis. There are two basic approaches to managing inventory flow, most often referred to as production push and warehouse pull. Production push is the more traditional system. Warehouse pull is a newer method.

Most of the time, the pull system is better to the needs of the total beverage industry product and distribution system because it makes the actual customer demand the basis for replenishing inventory. However, in order to satisfy customer demand without interruption, a certain amount of inventory at the production facility must be ready to go out the door. This is where the productions push system works well. Both production push and distribution warehouse pull system are useful.

Both systems share five general characteristics.

1. PERIODIC DEMAND FORECAST: one, in both systems a periodic demand forecast is drawn up based on inputs from sales and distribution sources.
2. GENERATE PRODUCTION PLAN AND PRODUCTION SCHEDULE: Two, in both system the periodic demand forecast is used to generate a production plan and a production schedule.
3. INVENTORY VISIBILITY: Three, in both systems, information on inventory quantities and activity at each outlying location must be readily available to the central coordinating location. This is frequently referred to as inventory visibility.
4. INVENTORY POLICIES AT THE SKU LEVEL FOR EACH LOCATION: Four, both systems require inventory policies at the SKU level for each location. The policy guidelines are important to use for planning minimum and maximum quantities, as well

as shipment sizes. These guidelines should be consistent with inventory flow principles and recognize infrastructure constraints.

5. RATIONALIZED PRODUCTION LOTS: Five, in both systems, production quantities are determined based on rationalized production lots and inventory quantities. A rationalized production lot is a realistic economic order quantity that takes into consideration such practical operating factors as syrup preparation and capacities, flexibility and capacity of production lines, flexibility of labor, and availability of materials.

THE PUSH SYSTEM

In the production push system of inventory flow management, the periodic demand forecast is converted to a production plan and a production schedule. The push production schedule is then converted to a transportation schedule that allocates quantities for shipment to each distribution point based on each forecast. Quantities are shipped to each distribution point based on inventory recorder points production allocation and predefined shipping quantities. Distribution locations must accept these shipments.

In the production push system, the production facility or some other points of centralized planning and control manage and controls the movement of inventory between its location and distribution centers. The push system is useful in situations where it is difficult to establish or maintain a timely flow of information between producing and distributing locations. The push system is also useful during promotion periods, when products must be pushed out of the producing location on an allocation basis. In the warehouse pull system of inventory flow management, the demand forecast also serves as the basis for the production plan and production schedule modification are based on inventory replenishment considering distribution point. The transportation schedule is based on distribution point. The transportation schedule is based on distribution point replenishment requests. Then, each distribution centre monitors and adjusts the replenishment of inventory for its own location movement if inventory may be controlled by centralized or decentralized management.

THE PULL SYSTEM

The pull method for inventory flow management focuses on responding to customer demand. The customer is seen as on important sources for determining which SKU's are needed, where and in what quantities. While the push system sends out items based on forecasted demand or a blanket allocation, the pull system sends out items based on what a distribution center requests, which in turn is based on customer demand. The pull system operates on the just-in-time principle to generate a quick flow of information and materials. Doing this cuts costs by eliminating waste, such as inventory that sits too long or a large safety stocks.

In general, the pull system does a better job than the push system of balancing the various

operating factors in today's complex beverage system and making optimal use of today's technology. When the pull system of inventory management is integrated with production scheduling and resource planning, it facilitated matching supply with actual demand within the supply chain and a reverse flow of planning information from customer to suppliers. In other words, it begins to look a lot like the seamless tube of customer satisfaction the straight, wide, unobstructed pipeline in which all function work together to deliver a quality production.

ADVANTAGE AND DISADVANTAGE OF THE PULL SYSTEM

The pull has a number of advantages like

1. It is flexible
2. It allows inventory flow management to react to change more quickly and accurately than the pull system.
3. It promotes visibility. It is easy to see everything that goes through the system.
4. It lowers inventory costs.
5. It results in production that is better targeted to actual demand, which in turn results in better product availability and improved production quality.
6. The pull systems also have some disadvantages like
7. Its flexibility can be constrained by plant production capacity. If the plant operates close to production capacity, it will have difficulty responding to change in the pull system.
8. To work with maximum effectiveness, the pull system requires accurate, timely and good quality information.
9. Yields may be lower under the pull system than with the push system.
10. Since the pull system may reduce production line efficiencies, its implementation will require a responsive manufacturing organization.
11. If production is interrupted unexpectedly, the pull system's lower inventory may result in shortages and a greater change of stocking out.

PREPARING FOR INVENTORY FLOW MANAGEMNT SYSTEM IMPLEMENTATION

1. If the FMCG changes from the push system of inventory management to the pull system, several factors need to be implemented to ensure the pull system's success.
2. First, the organization must be educated about the pull system, how it operates, and what to expect.
3. Second, the crossover must have the commitment of the management team and the support of senior management.

Third, performance measures must be established that are in line with supply chain objectives.

Fourth, timely and accurate information on inventory quantities and demand must be available for all location.

Fifth, an accurate forecasting system must be established, and there must be ownership in the system among sales and operations management.

Sixth, operation parameters, such as lead times, capacities, and cycle times, needed to be understood for productions, transport, and warehousing.

Seventh, good communication and information are essential, the complexity of today's business requires a responsive, integrated software system. And finally, a transportation scheduling system is needed.

CONCLUSION

The first priority of all employees in FMCG manufacturing and distribution system is to satisfy the customers demand for production. Controlling the flow of inventory to match customer's demand, while scheduling productions and transportation in a manner which can maximizes the use of resources is a constant, complex balance. Effectively managing the transportation of materials throughout your processing and distribution centers, and having the ability to reach to changing business demand, requires the right policies, produces, and systems.

The marriage of technology and processes that are based on industry best practices and achieving this balance effectively is the key objective of inventory flow management and an organizations success in today's growing challenges. Proper inventory management is a vital part of the "Seamless Tube" within the FMCG company system, where the common focus of every function is customer satisfaction. The goal is to produce the highest quality product at the best cost, packaged and delivered according to customer demand.

Properly managed inventory ensures that customer and consumers have an uninterrupted supply of delicious, refreshing products of the FMCG companies. This is the highest form of customer service. Today most of the industries/ companies implemented SAP and also implementing SAP, because SAP is giving the full fledged solution for their business requirement and it is meeting customer/ client requirements without huge customization.

For example, if one takes FMCG industries, one wants to know the status of their inventory on daily/ weekly/ monthly/ yearly basis. Because at the end of the day, management wants to know the movements of the goods/ products for their, further planning and also to maintain the balance between demand and supply. For optimal inventory management processes, we need robust functionally for managing our logistics facilities. Support for inventory management helps us records and track of each material on the basis of the both quantity and value. We can reduce the cost for warehousing, transportation, order fulfillment, and material handling while improving customer service. We can significantly improve inventory turns, optimize the flow of goods and shorten routers within our warehouse or Hub/ distribution center. Additional benefits of inventory management include improved cash flow, visibility and fast and good decision making.

Inventory management offers one of the largest opportunities in supply chain management. End to end inventory visibility increase buyer purchasing power, minimizes inventory levels, ensures product balance, and ultimately reduces warehousing costs.

REFERENCES

i. Public health security and bioterrorism preparedness and response ACT of 2002—U.S. Food and Drug Administration, center for Food safety and Applied nutrition July 17,2002

ii. Bio-security in the Meat Industry July, 2002 Edition Meat processing, North American Watt publishing Company 2002

iii. Heads Up for HACCP Michael Cramer edited by Jeremy Russell National meat Association October 15, 2001

iv. Harris F.W (1913); How many parts to make at once factory: the magazine of management 10, 135-136, 152

v. Silver , E.A & meal, H.C (1973): A Heuristic for selection Lot Size requirements for the case of a Deterministic time: Varying demand rate and Discrete opportunities for Replenishment, production and inventory management, 14, 64-74

vi. http://commons.wikimedia.org/wik/file:FEMA_25982_george_armstrong_takrn_on_08-28-2006_in_Georgia

vii. Inventory management (OIC_CO3) article on inventory data from ECC to BI/BW system by surrender Kumar Reddy Koduru on 14 November 2009

viii. http://www.capgemini.com

ix. http://www.uk.capgemini.com/news/pr/pr 2144/inventory

x. supply chain council (2000a), homepage http://www.supply-chain.org

xi. Towill, D.R., 1997, 'the seamless supply chain-predator's strategic advantahe', international journal of technology management, 13(1), 37-55

xii. COYLE, J.; BaRDI, E.; NOVACK, R. transportation. USA: South-western College publicating, 1999. 512p.

xiii. Efficient consumer response, http://www.ecr.org

xiv. American production & inventory control society, http://www.apics.org

xv. Beamon, B.M., 1999, "measuring supply chain performance, "International journal of Operations and production management, 19(3), 275-292

xvi. Hartmut, s., and kilger, k., 2000, supply chain management and Advanced planning, hiedelberg.

xvii. Stevens, G., 1989, ' Integrating the supply chain,' International Journal of physical distribution and materials management, 19(1), 3-8

xviii. Kumar, D. 2002, "integrated lean supply chain design for inbound supplies," IIE's lead management solutions conference, September 10-11, 2003, Atlanta, USA, "Vision: the journal of business perspective, MDI, Gorgaon, India.

xix. Davis, T., 1993, "effective supply chain management, " Sloan management review, 34(4), 35-73.

Global Journal of Enterprise Information System

Jan 2011- March 2011

Volume-3 Issue-I

THE CONCEPT OF CYBER-CRIME: NATURE & SCOPE

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ABSTRACT

Cyber crime is whether myth or reality? Nothing is crime unless prescribe by law. But most of the categories of cyber crime is still beyond the reach of law. Even there is lack of unanimous consensus over the commonly agreed definition of 'cyber crime.

Present article has attempted to conceptualize the 'cyber crime'. The analysis is from legal point of view and various aspects are touched upon. A cursory glace has been given to whether cyber crime can be accommodated within the existing legal framework or does it require a complete new approach? This article has analyzed the operational modality to combat cyber crime and its probable difficulties in the traditional system which is based on different principles, which in cyberspace hardly respect and difficult to govern. The objective of these analyses is to verify the compatibility of legal system to coupe up with such techno-sophisticated criminality.

KEYWORD

e-technology	cyber crime
cyberspace	Computer

PREAMBLE

The advent of e-technology has brought variety of opportunities and some of these, not surprisingly, are of a criminal nature. The Cyberspace created by computer technology provides a medium of doing many things in efficient manner. The use of machine replacing human hands provided greater opportunities and options. The automation of companies, banks, educational institution, and railway reservation are reflections displayed everywhere that manifest dependence of human society on these tiny computers. Today, old-fashioned paper-based working pattern is merely outdated, as it is unable to keep pace with speedy life of modern world.

Societies world over in the last century have been largely concerning about crime affecting the physical persons and property. They have accordingly evolved state systems of law and enforcement to deal with the forms of crimes. Rapid industrialization and urbanization has brought new forms of crimes involving wider concerns of social order, safety, and security.[i]

If Cyberspace is the type of community - a giant neighbourhood made up of networked computer users around the world - then it is natural that many elements of a traditional society can be seen as bitts and bytes.[ii] With electronic commerce, emerge electronic merchants, plugged in educators provide networked education and doctors meet with patients online. It should come as no surprise that there are also Cyber criminals committing Cyber crimes.

Computer-technology helps any company to do work efficiently. The computer is a very sophisticated electronic machine used to manipulate data. As explained in the glossary of the Information Technology (Certifying Authorities) Rules, 2000,

'Computer mean any electronic, magnetic, optical or other high-speed data processing device or system which performs logical, arithmetic, and memory functions by manipulations of electronic, magnetic or optical impulses, and includes all input, output, processing, storage, computer software, or communication facilities which are connected or related to the computer in a computer system or computer network'.[iii]

Motivational factors for the growth of Computer Technology

The information, which is a very important aspect of every business and transactions, can be move very easily and manipulated in better manner with computer-technology. The Computer-machines are now-days overtaking the responsibility assigned to human brains. In addition, in this attempt it is providing better alternatives. A brief comparison of computer technology can be displayed in following manner:

a. **Computer has great memory power**. It provided huge storable space on comparatively very small floppy's and CDs. The entire library can be put in few computer discs.
b. **The speed of manipulation** of available data is **unimaginable**. The Computer can solve complex mathematical problems in seconds. The loan interest, for example, of the person standing in front of bank counter can be calculated in a fraction of seconds with accuracy.
c. **Computer can work round the clock.** Computers never form unions, ready to work anytime. Thus today, ATM machine facilitate the banking transactions 24 hours, which earlier were just restricted to few hours a days.
d. **Computer can do multiple jobs at a time.** Thus the same computer can ask to calculate pending matter, subtract a specific data, can be asked to present a show at specific time, able to maintain time schedule, and even can be asked to distribute the massage to thousands of customer.
e. It is old saying that '**No man is perfect on this earth**'. However, it is possible with computers. Computer only commits mistake if programme fed in it is wrong. There is a little bit of chances of committing mistake by computer itself.

All these plus points are responsible to replace man with machine and there is continuous dependency of human society on the machine. Ultimately, under the background of this machine power, the maximum institutions started to equip themselves with machine; the process is generally known as '**AUTOMATION**'.

The process of automation can be considered with the process of '**URBANISATION**'. When industrial revolution took place in the Mid-Seventeenth century, the big machines appeared on the scene. The industrial plants, turbines, ships started to appear and soon rural population started to migrate towards big cities. After a couple of century, we could see that the urban society is entirely different from rural one.

Thus, the wave of industrial revolution caused urbanization of rural society and completely transformed it. Urban society is different from rural one having slum areas, big industrial plants, cotton mills, working industrial population, poverty, fast life and so many things are the symbolic features of urban society. The weak tie of human relationship, degrading human values, flat & apartment culture, fashions, clubs, spacious roads, flyovers, railway bridges, dance bars, easy flow of money, 24 hours working, crowdie places, departmental stores, big moving vehicles waiting at signals, commotion of railway engines and begging children are some of the common scenes in urban society which are hardly visible rural society. As life, so as to crime differ in urban society. As money is move valuable than values in urban society, economic crime rate is more. Due to lack of fraternity, neighborhood belongingness in urban society, criminal even can commit dacoit in daytime. Minimum social pressure, lack of social control makes urban society very different from rural one.

As the 'Urbanization', so as the 'Cyberisation'. The same change that we have seen in the process of urbanization can be similarly observed in **Cyberisation**. While human being is Cyberised (or treat it as de-socialized), they are losing and lacking human qualities, no value and respect for relations and relatives. In Cyber world, you can find youths spending their time in chatting, looking sex partners, surfing for pornographic material. Cyberisation, in other way can be termed as revolution of Information-Technology. This Information-Technology revolution is enormous than earlier revolution has taken place so far, and the changes and transformations it has caused in the society is also comparatively immense. In Industrial revolution that took place a couple of centuries ago highlighted the presence of big machines likes steam engine, locomotives, ships, cranes were appeared, but today, tiny machine are there sometime only with three components i.e. Monitor, CPU and keyboard which can be kept in small space of 5 fts X 5 fts room. However, potential capacity to change the society is much greater than else before. This device as compare to olden day's ship can travel its user faster and can escort the netizens in any part of world, can make possible his virtual presence.

Thus these connected computer machines has created a different world called Cyber-world or Cyber-space. It is a different world altogether. Quite different from our real world! Due to special nature of this Cyber-space, the Cyber criminals get maximum opportunity to commit crime. Because computer may facilitate the commission of traditional nature of crime like fraud, theft, defamation, pornography in new form as well as give rise to new mischief's such as hacking, virus transplantation, erasure of programs or data.

Under this backdrop, it is essential to analyze and understand the different nature of Cyber-crimes, its definition, scope with comparative analysis with that of 'old-traditional' criminality.

COMPARATIVE INVESTIGATION OF CYBER-CRIMINALITY AND ITS NATURE

I. **Comparative analysis: Modern & Traditional crimes**
II. **Incidences of Traditional crime - easy to deal**

To understand the sea change computer technology has introduced to criminal activity, the hypothetical example may dictate it properly: Consider this one,

> 'One can analogize a denial of service attack to using the telephone to shut down a pizza delivery business by calling the business telephone number repeatedly, persistently and without remorse, thereby preventing any other callers from getting through to place their orders. While it may be possible for someone to execute this scheme, it would be very onerous to do so because it would require a great deal of physical effort and concentration on the perpetrator's part; he would have to be constantly dialing, maintaining the connection until it was broken and then redialing quickly to prevent any other call from coming in. It would also involve a significant risk of apprehension because the victim could contact the authorities, who would presumably have no difficult tracing the calls to the perpetrator, since he would presumably be using his personal or business telephone.[iv]

The incidence of traditional crime, most of the time, is easy to deal by law regulating agency. Here location can be traced out, person can be identified, facts and issues can be investigated, telephone calls can be scrutinized, `***mens rea***' can be ascertained and liability can be imposed. However, in the incidence cited above, the legal machineries may be paralyzed to deal with above-mentioned problems. Generally, and in most of the traditional crime cases, the problem of jurisdiction may not arise in above case, physical search is possible and above all, the law applicable to both perpetrator and victim is same. Too great extent, the traditional legal system is well equipped to handle, investigate, scrutinize, and examine the facts related to the crimes.

Demarcation between Cyber-crime and that of so called traditional crime can be traced out on some distinguished footings. However, ironically, one may mislead term in physical sense. Thus physical harm inflicted to computer, stealing of computer machine, theft of computers from the home or institute or any part of computer such as hard disc, monitor or keyboard, making fraud in selling computer machine is not computer crime though on first sight it may seems to be 'Crime committed against a computers or by means of computer' OR 'Harmful act committed from or against a computers or networking. The description of Cyber crimes given above as elaborative sense.

Cyber crime is easy to commit (if one has the know - how to do it), hard to detect (if one knows how to erase one's tracks) and often hard to locate in jurisdictional terms, given the geographical indeterminacy of the net.[v] The ability of Cyber criminals to morph into new and different forms of antisocial activities evading the reach of existing penal law creates challenges for law enforcement around the world. Cyber-criminals can exploit gaps in their own country's criminal law to victimize their fellow citizens with impunity. They can also exploit gaps in the criminal laws of other countries to victimize the citizens of those and other nations.[vi]

INCIDENCES OF CYBER CRIMINALITY

Relatively, in case of Cyber-criminality, Cyber space allows these attacks easily carry out and such intrusions can be made effortlessly with very little risk of apprehension. First of all, it is very difficult to fix the identity to the perpetrator in Cyber-space as it is very easy to mask a fake identity. You can have a mask of famous hero, heroin, politician or even policeman with photo-identify in the Cyber-space. It is difficulty to see the person actually sitting in front of terminals and only the manifested identity is only source in Cyberspace. Secondly, it is difficult to locate the jurisdiction and locality of the perpetrator. Neither it possible his intentions and benefit he receive from such deviation. However, one can face these preliminary difficulties in Cyber-space.

i. Cyber-crime is not synonyms with Internet crime

Generally, it is mistaken belief that Cyber-space is synonyms of crime committed across the Internet-networking, as former is much wider expression encompassing - besides Internet, the computer and its networking, data present in digital form in the computer or on any storable devise, software and hardware in any functional form. Cyber crime may be committed even by remaining offline and it is not necessary that the person should physically remain present online in the networking of computers. Thus software piracy is the crime committed by the person by taking the software copy on disc or floppy and transmits it.

ii. The fashion of 'Computer literacy' fasten the process of Cyberisation

Today the courses pertaining to 'computer literacy' training become an integral part of curriculum. Due to the vast use of electronic devices within the atmosphere available around the new generation, the new generation very easily got electronic indoctrination. Right from the age of spoon-feeding, electronic technology surrounds them. Thus, when they come out of their tender age and got capability of stepping into Cyber-space, vast Cyber-world open a getaway for endless opportunity. However, due to tender age and lack of judgment capability there are equal chances of their exposure to the evil effect of this technology. Thus on one hand, technology that is an essential part of their curriculum hurled them in the unprotected Cyber-world.

iii. Cyber Crime - Neither difficult to learn nor difficult to commit

Cyber-crime is neither much hard to learn nor much difficult to commit. In modern society, computer technology can be learned like language. Digital technology surrounded our life to such a great extend that everybody is being acquainted with it. Particularly, the new generation for whom computer knowledge is an essential part of curriculum, and where knowledge diffusion is with the help of computer it is very easy for them to have

convenience accessible means to commit crime in Cyber-space. Incidences are there, where initially, computer is learned either out of curiosity, pleasure or compulsion (may be official or educational) or latter on learning knowledge turned into delinquency. The user-friendly software has added fuel to the fire making Cyber delinquency much pleasant and easy. This is true, particularly with regard to pornography, vulgar chatting, and piracy. Today, anybody with minimum computer literacy is sufficient to have access to Cyber-criminality and the chances are very less of being trapped by the preventive agencies. These features make Cyber-crimes more dangerous and alarming.

iv. Difficulties in tracing the Cyber crime

If one is enough fortunate to overcome these difficulties of locating, investigating and fixing the criminal liability, the next complexities he has to face about the collection, examination, scrutiny, instigation and recording and reading the evidences and witnesses. Speaking with example, suppose in the example of Cyber-stalking cited above, perpetrator used computer for the purpose of hacking and stalking the web site of pizza parlour via Internet, how can the recording and reading of evidence is possible even if, the instrumentality of an offence i.e. computer has been seized? Again, whether does legal system has capable of recognized such evidence in electronic form? Suppose, again the hacking or stalking has been committed from paid Cyber-café, then how the presence of criminal can be located? In short, such problems make Cyber-criminality more severe and serious in this millennium.

In addition to that, as due to Internet facilities, Cyberspace don't recognized boundaries, barriers or line of control of the nations, the problem of jurisdiction also create problem in Cyber-criminality. Thus the potentiality of Cyber criminals to morph into new and different forms of antisocial activity evading the reach of existing penal law create challenges for law enforcement around the world. Cyber criminals can exploit gaps in their national criminal law to victimize their fellow citizens with impunity. They can also exploit gaps in the criminal laws of other countries to victimize the citizens of those and other nations.[vii]

v. Are there any alternatives to Cyber technology to avoid Cyber criminality?

The situation mentioned above creates a dilemma. Should we reject the technology at all to avoid its evil effect on existing system? Should we take a pause for progress as it does bring uncertainty and complexities? Should we stop at the point where we are and just try to maintain present system as it is? Should we stop the use of Cyber-technology to stop its misuse and its dangerous impact in the form of Cyber-crime?

Do at all such objective alternatives are possible for us? Can we stop the flow of time and change? Can we bring to a halt (and lock up) all inventions and discoveries oozing out of laboratories? If this is not at all possible to reject invented discoveries, what are the other alternatives available for us? In this situation, whether is it possible to taste the fruits bypassing or avoiding its drawback?

No doubt, that there are growing incidences of misuse of Cyber-technology, particularly Internet services that include all Cyber crimes and the Indian scene is not exception to Cyber-criminality. Today, the cases are comparatively less than advance countries (despite the Cyber-illiteracy in India, most of the cases neither detected, reported, not bring into light or gone unnoticed, or fall victims of our traditional legal infrastructure) the pace with which the automation process is going on in India, the days are not far when we require to either reject the technology or safeguards against its probable threat. It is even unwise to reject the technology because crimes are committed online. The online crime commission rate is not strong reasons rejecting the entire technology particularly when its use outweighs its misuse. It is just like telling the people to avoid use of vehicles, as there are chances of accidence, or telling the people not to come out of their homes, as there is danger of life in outside world. On developmental path, no U-turn is allowed and once you step in the process, there is no way out.

Do you think that people would avoid using Internet due to growing number if net abuse?

Specially, when visionary eyes can see the bright future through Cyber-technology, particularly education, business, banking, and information

sharing services are switching over through the network. Under these considerations, should anyone dare to say, 'Avoid/Reject getting misused'. In short, Cyber technology is non-optional, and we have to have it!!!

vi. If Cyber technology is non-optional, there is only one way - accept it boldly

Such questions lead to give a thought for development of system for prevention and control of Cyber-crimes. Whatever the impact of automation on human civilization may be, but it is non-optional phenomenon in competitive life and we have to accept the presence of electronic devices in every walk of life. These electronic devices are so deeply penetrated in our day-to-day activities that we even cannot imagine life without it! All activities in our life such as trade, business, transaction, communication, transportation, invention, education, calculation, medicine, and banking involve use of computers. Thus, today '***Life without computers***' can't be imagined.

Today information is a life-blood and important for our existence. Life minus information will reduce the human society to just its physical existence. Information makes man think and act and thus become pre-requisite condition of human expression. Information is one of the indexes of demarcating a line of distinction between human and animal. Information in electronic age is synonyms with either power or source of power. In order to survive in competitive market, information is essential. It is only due to advent of electronic era, information got electric speed and it is possible to remain up-to-date (may be up-to-fraction of second) with the help of electronic devices. In the absence of this system, the market would never survive for the next moment.[viii] Today, computer networking is providing electric speed to the information and magnetic brain to store information and manipulate with the help of software. Nevertheless, this field is also not exception to the Cyber-criminality. The piracy, theft of Internet hours, Cyber-bombing, e-mail bomb, and Cyber-terrorism are certain brand names from which alarming signals are blowing.

vii. Strategy to be adopted

The problem of Cyberspace starts with the non-recognition on the part of legal system. Generally, and at most of the occasions, it has been observed that legal reality differ from bookish philosophical notions appears in law books. Cyber law exists at the (cutting) edge of law, where the ability of existing law to achieve its goals is challenged. In this sense the "law" in Cyber law is a much broader concept, it is "law in action" as opposed to "law in books" as it applies to situations where Law cannot cope. Moreover, the technological revolution has wrought in its wake various security issues and there was an urgent need for security experts as well.[ix]

But so far as strategical aspect in Cyberspace is concerned, it is now a need of an hour to face it, rather than ignoring or running away from it. It is wise saying that ***'don't avoid, face it'*** and it is equally applicable to Cyber-technology also. Positive attitude and clever move demands the adoption of intelligent strategy. Proper use is better than no-use. Thus regardless of thinking about avoiding technology, we can work out a plan for its proper use. Instruction, awareness, consciousness, and Cyber-literacy can be the golden rule for using Cyber-technology. Speaking on the same line, one of the famous website promoted the awareness amongst the netizens.

> A better strategy would be to instruct netizens (children) about both the benefits and dangers of Cyberspace and for them to learn how to be "net -wise" in order to better safeguard themselves in any potentially dangerous situation. Make sure the kids know it is okay to approach you if they receive strange or harassing e-mails that makes them uncomfortable or they accidentally get to a site you have told them is not appropriate. Let them know that you won't get angry and that it isn't their fault if they do get something strange or they find a site by accident. Establish the ground rules and let the kids clearly know what they are. Every family is different and every child is an individual, so there are no 'magic rules' to follow beyond the basics. The more open you are and the more you listen, the more likely they are to tell you what is going on. Most of all set a good example by yourself visiting good site![x]

viii. Cyber criminality naïve the traditional boundaries of nation wide jurisdiction

The Cyber criminality, as stated earlier, spread in the Cyber-space and the Cyber-world is too great extent differ in quality and its quantum with that of traditional world. These qualities are: its lack of respect for jurisdictional boundaries, the sheer volume of traffic that it can handle virtually

instantaneously, its openness to participation, the potential for anonymity of members of the virtual community, its apparent economic efficiency. It is these very qualities of Cyberspace, which has today become its nemesis and has necessitated the need for Cyber law.[xi]

Thus these are the various angle of Cyber-criminality and related issues. Attempting to scrutiny whether the Cyber-crimes are reality cause any threat to India, the nation where it is in just infant stage? Whether Cyber-crime has become reality in India, or it is just an '***Abominal story***'?

CYBER CRIME ON INDIAN SCENES

i. Cyber criminality - dawning reality in India

Evidently, he was William Gibson, American Novelist by profession, who introduced the word 'Cyberspace' in his famous novel *Necromancer* in 1984.[xii] It has subsequently become widely used as a means of denoting the apparent or virtual location, within which electronic activities are undertaken.[xiii] By 'Cyberspace' in the novel '***Necromancer***', he was insinuated the visual world breathing in electronic activities. The fictitious world was capable of pretending visual reality, totally mechanical and electronic! The 'Cyberspace', according to William Gibson, where the visual reality exists, and the overall populous are immersed & emerge in the digital world. Thus, the aggregation of computers, Internet, and intranet is dubbed as Cyberspace. Such a Cyber networking allows citizens of a community to connect to the global computer communication network and provide them with the facility to communicate with other members of their own community and with the world, popularly, branded as netizens. Therefore, the netizens are net citizens, who utilize the net from their home, workplace, school, library, etc.[xiv]

And today, the Cyber crime has become reality in India. Difficult to detect, seldom reported and even more difficult to prove, computer-related crime lacks a traditional paper audit trail, is away from conventional policing and requires specialists with a sound understanding of computer technology.[xv]

ii. Modern Technology has activated mechanical transformation of human being

The modern technological inventions have brought with them some evils that now creating alarming situation that required urgent attention. In the modern age of communication and electronic transactions, the compelling need of automation to be remained in competition, dependence on mechanical speed created a bridge between man and machine, life and non-life entity, natural brain and artificial brain. These two extreme poles, man and machine, representing life and non-life entity is losing their unique qualities and moving towards each other. In the present scenario, erosion of human qualities and dripping out of human being, and advancements are made to add more human qualities to adroit i.e. artificial robots. In post-modern era, each object is losing human sensitivity evaporating its conceptualized base with its referenced boundaries, emotions, happiness, sorrow, love, affections, responsibility, values and much more 'life' itself. New technologies today provided sky-less limit and speed breaking the boundaries.

CONCEPTUALIZING CYBER CRIME - DEFINITION, ANALYSIS AND EXPLANATION

iii. Legal literature only prescribe, not describe Cyber crime

The law only prescribes the things but do not describe it.[xvi] Particularly, penal laws prescribe the punishment but do not attempt to describe the crime and its nature. Therefore, the legal literature hardly helps in this regards. It is unwise, therefore, to describe here Cyber Crimes, as ***"acts that are punishable by the Information Technology Act, 2000."*** Because the Information Technology Act, 2000 neither define nor describe any of the Cyber Crime. It has only stipulated certain act as an offence and prescribed punishment under Chapter XI titling "Offences".[xvii] However, various jurists, thinkers have attempted to define the term Cyber crime from various angles. Here in this portion we are going to consider some of the definition of Cyber crime in order to elaborate and understand term.

iv. Conceptualizing Cyber Crime - Mapping different dimensions

To deal, it is essential to limit the concept within the word's boundaries. It is helpful to encompass it within a literal periphery. Elaborating any concept from definitional point view is an attempt to attach some meaning full words for its explanation. Defining the concept is nothing but to endeavoring *'Why the things are things and not otherwise'*. In other words, by definition of Cyber crime, we are

trying to explain why Cyber crime is Cyber crime and not otherwise. The overall definitional part deals with the aspect of separating Cyber crime from other crimes and clarifies from other so-call similar words. Thus, it is an activity of putting similar things together and isolating it from dissimilar things.

v. Definition of Cyber crime - encircling the concept within words boundaries

In order to understand the Cyber crime at conceptual level, it is essential to scrutinize the definitional aspects of word 'Cyber crime'. In this portion, some of the definitions are verified.

i. **According to the website of Crime Investigation Department, Andhra Pradesh State Police, "Cyber crime means Unlawful acts wherein the computer is either a tool or a target or both."**[xviii]

According to the definition, the Cyber crime consist crimes-

a. **Where the computer is a tool for an unlawful act - and;**

b. **Where the computer is the target for an unlawful act.**

c. **Where computer is both tool and target for/of unlawful act.**

Ii. According to Manish Lunker, -

> ***"Computer or Cyber armies are considered as illegal, unethical, or unauthorized behaviour of people relating to the automatic processing and transmission of data, use of Computer systems and Networks".***[xix]

However, the present definition considers Cyber-crime and computer crime as one of the same thing, which though having some common premises, differ on several account. Again, this definition have rider like 'unethical' which, too great extent, fall outside the purview of law. Ethics is not basis for imposing legal liability.

ii. Another definition of Cyber crime may be considered as follows :-

> **"Cyber crimes are the harmful acts committed in Cyber space *with, on or by means* of computer networking."**

iii. The a further definition has given by Pavan Duggal, an advocate of Supreme Court and Cyber law expert, "Any criminal activity that uses a computer either as an instrumentality, target or a means for perpetuating further crimes comes within the ambit of Cyber crime".[xx]

Thus in Cyber crimes 'computer' may be –

a. an instrument and/or
b. target and/or
c. Means for commission of crimes.

iv. According to Balwinder Singh, Additional Secretary, Central Vigilance Commission, Government of India[xxi], "Computer (Cyber) crime mainly consist of unauthorized access to computer system, data alternation, data destruction, theft of intellectual property."[xxii]

> "**Any crime with the help of computer and telecommunication technology", with the purpose of influencing the functioning of computer or the computer systems.**[xxiii]

There are some more definitions appear in the literature

1) Cyber-crimes can also be described as "Crimes committed against a computers or by means of computers' OR 'Harmful act committed from or against a computers or networking."[xxiv]
2) Cyber crime is commonly referred to as a "Criminal activity related to technology and computers committed on the Internet."[xxv]
3) According to MyCert's manager Solahuddin Shamsuddin, "Cyber crimes includes illegal activities done with malicious purposes from electronic hacking to denial of service attacks that cause great loss in monetary terms to the affected victim."[xxvi]
4) According to Charles Nesson &, Anita Ramasastry, "Cyber Crime" is embrace criminal acts that can be accomplished while sitting at the computer keyboard. Such acts include gaining unauthorized access to computer files,

disrupting the operation of remote computers with viruses, worms, logic bombs, Trojan horses and denial of service attacks; distributing and creating child pornography via the Internet, stealing another's identity; selling contraband and stalking victims."[xxvii]

vi. Analysis of Definition - How so far Cyber Crime can be suitably described?

Above definitions have been attempted to describe Cyber Crime from one or the other angle. Depends upon the approaches it adopted, the above definitions can be classified as descriptive, functional, elaborative, purposeful or expressive. The above-mentioned definitions have been attempted to define Cyber Crime by affixing some rider, characteristics, and qualities to the nature of Cyber Crime. Some of the characteristics features of Cyber Crime can be categorizes as -

a.	**Cyber Crimes are Unlawful Act.**
b.	**Computer is essentially an element of Cyber Criminality and it is either a tool or target of Cyber Crimes.**
c.	**Cyber Crimes are harmful Act.**
d.	**Cyber Crimes are committed in Cyber-space with the help of Computer networking.**
e.	**Cyber Crime is a criminal activity where Computer can be used to perpetuate further crime.**
f.	**Cyber Crimes are committed against computer or computer networking either by means of computer or otherwise.**
g.	**Cyber Crimes are committed from or against computer networking.**
h.	**Cyber Crimes are criminal activities against technology and computer committed on Internet.**
i.	**Cyber Crimes are illegal activities done with malicious purposes.**
j.	**Cyber Crimes cause great loss in monetary terms to the affected victim.**

It is, therefore, clear from above discussion that Cyber Crimes are a sort of hi-tech criminality and harmful activities occur in Cyber space created by interlinking of computer networking via Internet.

CRITICAL APPRECIATION OF DEFINITION OF CYBER CRIME

Definitions appear in above section given by various jurist and thinkers have been attempted from various angle. To great extent, not a single definition attempted above compressively describe the Cyber-crime and it only attempted to describe the Cyber crime from the approaches adopted by the jurist and thinkers. Broadly, the above definitions can be categories into four part based on the approach adopted;

a.	**From its effect on a general society, it (Cyber crime) is :**
	i. **Unlawful act,**
	ii. **Harmful act,**
	iii. **Illegal activities**
	iv. **Criminal activity**
b.	**From victim's point of view -**
	i. **Affect victim and**
	ii. **cause great loss in monetary terms**
c.	**Considering essential tools used in Cyber crimes - it means when following things are utilized in committing crime -**
	i. **Computer**
	ii. **Technology (IT)**

iii. **Computer networking**

iv. **Internet**

d. **Considering the place where Cyber crime committed,**

i. **In Cyber-space.**

EXPLORING THE DEFINITIONAL DENOMINATIONS

The various definitional denominations affix to Cyber-crime by various jurists, thinkers, and legal luminaries cannot be put beyond criticism. None of the definition of Cyber-crime, if scrutinized from jurisprudential aspects, can pass the test on legal standard. Because, the words used in the definition like, 'unlawful', 'illegal', 'harmful', 'criminal activity', 'monitory loss', et al., is difficult to encompass within the jurisprudential limit and sometime, either Cyber-crime or the literary limit of these words cross boundaries and step out of legal premises and require to study the concept from social, political, economical or even psychological point of view. This is equally true with other phenomenon.

For the time being, therefore, the careful analysis of these definitions from jurisprudential angle revealed certain cynicism.

Firstly, it is erroneous to brand Cyber crime as **'unlawful'** act. For any act to be unlawful, the prior existence of legal prescription declaring a particular act is necessary. No doubt, that Information Technology Act, 2000[xxviii] deals[xxix] with some of the Cyber crimes, but all the catefories of Cyber crime have not been covered by the act,[xxx] and therefore, some of the Cyber crime still falls out of the legal reservoir. In short, the test of 'unlawfulness' makes only some of the Cyber-crime within the preview and keeps most of it outside. The same criticism can be made about those definitions describing Cyber crime as 'illegal' or 'criminal' act.

Secondly, it is wrong to say that Cyber crime is **'harmful'** act, though most of the Cyber crime may be, but there are some of the categories of Cyber-crime, which are not strictly, consider as harmful. For example, viruses are not harmful, unless and until they are activated. There are some of the viruses, which lay within the hard disc and activated only after clicking a particular program. Therefore, unless a specific program is not comes into operation, these viruses lie as usual and do not sustain harm. Another example can be given of those persons who use fake identity but while surfing they cast votes, give their opinion, take part in good discussion, or even make some academic conferences while chatting. In such situation, the person whose identity has been used, sometime benefited by such act. The incidence can be compare with the famous case of **Ashby V. White** where the person whose legal rights were violated did not suffer any harm, loss or damage in monetory sense. Thus, harm, loss, or damage cannot be considered as the only criterion for describing any act illegal. Actually, it is misuse, not harm, which is basic ingredient here to be considered.

Thirdly, again, the terms like 'against computer', 'on computer' seems to be misleading. These definitions make all those acts as a Cyber crime, which is committed on, by or against the computer. Thus, it will include the act like theft of keyboard, mouse pad, hitting a computer by stick, or even making electric power off while computer is in operation, which causes loss of data! Logically, all these acts are committed on either by or against the computer, but cannot consider as categories of Cyber-crimes.

Fourthly, the terminologies like 'Cyberspace', 'computer networking', 'technology', or 'Internet' needs further clarification and in absence of such clarity, any definition that includes such words make situation more vague and worse than before.

The definition, at this point, that seem more accurately describing Cyber crimes is -

"CYBER CRIME IS HARMFUL ACT OR MISUSING COMPUTER TECHNOLOGY."

The above definition to some extent expresses Cyber crimes, though the word 'misuse' again creates some difficulty. In what sense should the word 'misuse' be interpreted? Tentatively, the misuse here has been considered setting international standard within the focus. As stated earlier, Cyber-crime is trans-national criminality and therefore, attempting its definition totally from the point of view of private international law may create some difficulties.

vii. Cyber Crime and related terminology

In order to understand Cyber crime, from the point of view of definition mentioned above, it is essential to give a thought to the words like Computer networking and Internet. Computer networks are

telecommunication highways over which information travels. Section 2 (j) of the Information Technology Act, 2000 defines computer network as:

The interconnection of one or more computers through the use of satellite, microwave, terrestrial lines or other communication media; and terminals or a complex consisting of two or more interconnected computers whether or not the interconnection is continuously maintained.[xxxi]

In simple words, a computer network is purely a system of interconnected computers. Secondly, the word Internet is world wide interconnected networking of computers. The difference between computer networking and Internet is that of degree. Because, Internet is a wider concept where the computer is linked to rest of the world via networking which is available and spread over the world. However, computer networking may spread over to the world, to an organization, to a single premise, or even restricted to the single room. The depending upon the area it cover, computer networking may be classified as WAN (Wide Area Network) and LAN (Local Area Network).

SCOPE OF CYBER CRIME

The next issue under discussion is ***whether really Cyber crime are worth important to be considered on different footing than traditional criminality?*** The answer is simply **' YES'**. Justification, however, can be argued under following heads;

viii. Does Cyber Crimes are worth to take seriously?

Until a couple of year before, 'crime' was small-scale, simple, and consistent and can be traceable with available tools. It is simple in the sense that nationwide generalization, wide definition capable of encompassing within the words limit is possible. Even declaring any act as an unlawful by legislative enactment prescribing punishment for its violation was enough to lower down crime rate. Most of crime and related phenomenon remain personal, and though wide, it remained small-scale. Thus until recently crime is treated as anti-legal and anti-social activities committed by illiterates, (except While Collar Crimes & Organized Crimes), impatient, mentally weak person, or committed under sudden provocation, under tense emotional stress, or sometime out of necessity, or exceptionally, to settle the score with victims.

Again, these simple types of crime are easily traceable with available tools. As most of the crime are of personal nature, and both accuse and victim share same community tie that put offenses into a manageable, knowable context. In short, criminality as we traditionally have understood, wrapped by social atmosphere where social pressure use to keep criminality within manageable limit, either exerting social knots or socially oriented approved system. The social atmosphere not only mount a sort of buffer solutions, but also gave citizens at least the illusion of security, the conceit that they could avoid being victimized if they avoided certain activities or certain associations.

ix. Cyber Crime - Where the difference lies?

Difference between Cyber-crime and traditional crime

First of all, Cyber crime is essentially committed on or with the help of Cyber technology. Therefore, nature and scope of Cyber-crime should be analyzed on different footing. Therefore, uses of computer, an electronic device, for the commission of crime is essential ingredient of Cyber crime. However, traditional crime does not have such condition precedent.

Cyber-crime differ from so-called traditional crime because Cyber-technology provides wrongdoer special conditions where he can hide his identity, even wrongdoer can use fake identity, he can have access the computers of victims without his knowledge and without any restrictions. Here no national boundaries can restrict the entry of wrongdoer. At the same time, procedures developed to trace out the traditional crimes may not be useful in case of Cyber crime. Most of the time no fingerprints available, no blood stain, no DNA test analysis is useful to fix the identity of an individual. Moreover, he may not be essentially having presence within your national boundaries that causes difficulties in investigation of crime as well as arresting the criminals.

The nature of Cyber-crime is somewhat different from traditional crimes. Moreover, special category can be created under the banner of Cyber-criminality to provide different treatment to the crimes falling under this head. The plot of commission of crime may entirely different in case of Cyber-crime.

Therefore, for most of the traditional crime is concerned, physical presence of criminal is essential for commission of crime. Therefore while commission of traditional crime and afterwards we may trace out the presences of criminal on the scene. In such cases physical presence of an offender become most important question and his defense in the form of alibi play important role. However as Cyber-crime may be committed without being remain present on the actual scene of commission of crime, the techniques developed to trace out the offenders committing traditional offences are not more useful. In Cyber-crime, one may not find hairs, fingerprints, footprints, bloodstains, and smell of offenders. These sniffers (police dogs) are hardly having any use in case of Cyber-crime.

x. Cyber crime - the Space which does not recognize and respect territorial boundaries

The Cyberspace is the place where the entire place is opened for all surfers irrespective of his nationality. Everybody can enter into Cyber world without visa or passport. Thus Cyber Crime presents the nations of the world with a problem they have never before had to address, i.e., the permeability of national borders. Technology gives the ability to loot and inflict harm upon the entire world with little risk of apprehension and allows for experimenting with new varieties of criminal endeavors.[xxxii]

CYBER CRIME - MIXTURE OF TRADITIONAL AND MODERN

Some of the Cyber crime that appears in Cyber space is resemble with the traditional criminality only with the difference that they are committed in Cyberspace with the help of computers. Some of the Cyber crime that resemble with traditional crime fall in the categories of economic offences. Thus Cyber crime (that) ranges from economic offences (fraud, theft, industrial espionage, sabotage and extortion, product piracy, etc.) can be discussed on the same footing as if of traditional crime only with the difference that they have been committed with the help of computers. Therefore, while dealing with the crime similar with old-fashioned crime, only procedure will be different. However, some of the crimes committed in Cyber space are entirely new in varieties, e.g. infringements on privacy, propagation of illegal and harmful content, facilitation of prostitution and other moral offenses, and organized crime. At its most severe, Cyber crime borders on terrorism, encompassing attacks against human life and against national security establishments, critical infrastructure, and other vital veins of society. As these crimes involve a complex phenomenon either due to its special type or due to its transnational nature, it requires to be considered on entirely different footings.

CONCLUSION

Thus *may it be*, at conceptual and substantial level, Cyber crimes do not appear as a separate category and can be treated on the same footing with traditional crime; however, the analytical scrutiny reveals some different criterion for consideration. Some of the categories of Cyber crimes are definitely resemble with traditional crimes, but some are entirely new. At the same time the Trans-national nature of Cyber crime, compel the legal thinker to have second thought over it. Thus on the ground of Trans-nationality, global effect, technological involvement and non-applicability of traditional tools of investigation deserve separate jurisprudential approach for Cyber Crime.

At the same time, difference in various model of criminal justice system in different part of the world, different ideologies, principles, notions and objectives of each nation make Cyber crime more difficult to define and deal. Cross-border reflection of Cyber crime definitely requires separate procedure, investigative mechanism, and international cooperation and trans-national treatment. On this account, definitely, Cyber crime differs from traditional crime and capable of forming separate heads in penal laws and criminal procedure laws.

REFERENCES

[i] http://www,nytimes.com, David Post (Cyber law specialist, Temple Law School), 'Netiquette', visited on 8th Aug, 1999.

[ii] Reuters, 'Digital world still feeds no paper', *The Hindu Business Line, 8th Oct, 2000.*

[iii] See, Schedule V of the Information Technology (Certifying Authorities) Rules, 2000.

[iv] Jain Atul : Cyber Crime - Issues Threats and Management Vol. 1, Isha Books Delhi, pg. 3.

[v] *Charles Nesson & Anita Ramasastry, Cyber crime, http://Cyber.law.harvard.edu/studygroup/Cybercrime.html*

Last updated: June 22, 2002, accessed on 26 April 2005, 21:30:45

[vi] Jain Atul, *Cyber Crime : Issues Threats and Management*, (Vol I) Isha Books Delhi, pg. 4

[vii] Jain Atul : Cyber Crime - Issues Threats and Management Vol. 1, Isha Books Delhi, pg. 4

[viii] The example of dependence of human society on mechanical atomization can be evidenced by analyzing the impact of 9/11. The comparatively, suffering by human causality were less than impact on worldwide market economic.

[ix] http://pgd.iiita.ac.in/index_files/about.htm An article entitled, *'Cyber Law & Information Security'* on the web site of Indian Institute Of Information Technology - Allahabad

[x] http://www.indianchild.com/Cyber_crime_in_india.htm Accessed on 22.01.2005

[xi] http://pgd.iiita.ac.in/index_files/about.htm An article entitled, *'Cyber Law & Information Security'* on the web site of Indian Institute Of Information Technology - Allahabad

[xii] Diwan Parag, & Shammi Kapoor, *Cyber & E-Commerce Laws*, Bharat Publishing House, 2000.

[xiii] Vishwambharan, Anupama., 'The information super highway', The Indian Express, 12 May 1999.

[xiv] Menon Shailaja, *Protection of Intellectual Property in Cyber Space*, AuthorPress Delhi, Pg. 5.

[xv] Cyber laws : Intellectual property and e-commerce security - Edited by Krishna Kumar, Dominant Publishers and Distributors, New Delhi, pg. 295.

[xvi] For e.g. S. 40 of Indian Penal Code, 1860 only prescribe 'Offence' *denotes a thing made punishable by this code' but do not describe what is meant by Offence.*

[xvii] In 2008, an amendment has been made to add few more offences in the Information Technology Act, 2000

[xviii] http://www.cidap.gov.in/mainwccrime.aspx See also, same definition appeared on the web site of Cyber Crime Police Station, Banglore, Karnataka, http://www.Cyberpolicebangalore.nic.in/Cybercrimes.htm

[xix] Lunker Manish : *Cyber Laws: A Global Perspective pg. 2(An article from Internet) See* http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN005846.pdf. accessed on 22 September 2005. 21:52:15

[xx] http://www.rediff.com/netguide/index.html accessed on 23.01.2005

[xxi] See, Singh Balwinder, Addl, Sec, Central Vigilance Commission, Government of India, An article on Internet (in .pdf format) entitled, Cyber Crime - A new challenge for the police

[xxii] http://www.cidap.gov.in/documents/Cyber%20Crime%20-%20A%20new%20challenge%20for%20the%20Police_1292005255 02%20PM.pdf

[xxiii] http://www.legalserviceindia.com/articles/article.html - The Menace Of Cyber Crime by Anusuya Sadhu, Final year law student Symbiosis, Pune

[xxiv] see McConnell's : 'International Cyber-crimes & punishment – http://www.Cybercrimes.net Accessed on 26.12.2004

[xxv] http://www.niser.org.my/news/2004_11_22_01.html Accessed on 30.01.2005

[xxvi] http://www.niser.org.my/news/2004_11_22_01.html accessed 30.01.2005

[xxvii] *See, http://Cyber.law.harvard.edu/studygroup/Cybercrime.html Article entitled 'Cybercrime' by Charles Nesson, Anita Ramasastry.*

[xxviii] (21 of 2000)

[xxix] See Chapter XI 'Offenses' of Information Technology Act, 2000. Section 65 to 69.

[xxx] Though the Information Technology [Amendment] Act, 2008 has added few more categories of crime in the list, but this additions are still inadequate to accommodate the entire list of cyber crime under the one umbrella of the Information Technology Act, 2000

[xxxi] http://www.asianlaws.org/projects/network_crimes.htm accessed on 23.01.2005

[xxxii] Jain Atul, *Cyber Crime: Issues Threats and Management*, (Vol I) Isha Books Delhi, pg. 4

Global Journal of Enterprise Information System

Jan 2011- March 2011

Volume-3 Issue-I

TRAVEL ON YOUR FINGER TIP: A PARADIGM SHIFT BY MAKE-MY-TRIP

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ABSTRACT

Founded in 2000, MakeMyTrip is India's leading online travel portal. Created to empower the traveler with instant booking services and comprehensive options, the company began its journey with the United States-India travel market. MakeMyTrip offers a range of best value products and services, cutting edge technology, and round-the-clock customer support. Listed in Nasdaq Stock Exchange in August 2010 as MMYT

KEYWORD

Travel	Tourism
Click & portal model	Online travel agency

PREAMBLE

As the first and only comprehensive online travel site with real-time booking for flights, hotels, cars, and holiday packages, MakeMyTrip heralded a significant change in the way consumers purchased travel services in India. After its successful launch, the company has led the market with innovative products and services, consolidating its position in the market as a brand recognized for its reliability and transparency.

The portal sells more than 12,000 flight tickets,1000 hotel room nights, and 100 holiday packages every day. MakeMyTrip attracts more than 3.5 million unique visitors every month.

MakeMyTrip.com, India's leading online travel company was founded in the year 2000 by Deep Kalra.

Created to empower the Indian traveller with instant booking and comprehensive choices, the company began its journey in the US-India travel market. It aimed to offer a range of best value products and services along with cutting-edge technology and dedicated round-the-clock customer support.

After consolidating its position in the market as a brand recognized for its reliability and transparency, MakeMyTrip followed its success in the US by launching its India operations in 2005. With the foresight to seize the opportunities in the domestic travel market, brought on by a slew of new airlines, MakeMyTrip offered travellers the convenience of online travel bookings at rockbottom prices. Rapidly, MakeMyTrip became the preferred choice of millions of travellers who were delighted to be empowered by a few mouse clicks!

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MakeMyTrip's rise has been lead by the vision and the spirit of each one of its employees, for whom no idea was too big and no problem too difficult. With untiring innovation and determination, MakeMyTrip proactively began to diversify its product offering, adding a variety of online and offline products and services. MakeMyTrip also stayed ahead of the curve by continually evolving its technology to meet the ever changing demands of the rapidly developing global travel market.

Steadily establishing itself across India and the world, MakeMyTrip simultaneously nurtured the growth of its offline businesses like its franchises and affiliates simultaneously, augmenting the brand's already strong retail presence further. Today, MakeMyTrip is much more than just a travel portal or a famous pioneering brand - it is a one-stop-travel-shop that offers the broadest selection of travel products and services in India. MakeMyTrip is the undisputed online leader, with its share of the travel market extending to more than 50% of all online sales, a fact evinced by the trust placed in it by millions of happy customers. Remaining reliable, efficient and at the forefront of technology, MakeMyTrip's commitment and customer-centricity allows it to better understand and provide for its customers' diverse needs and wants, and deliver consistently. With dedicated 24x7 customer support and offices in 20 cities across India and 2 international offices in New York and San Francisco (in addition to several franchise locations), MakeMyTrip is there for you, whenever and wherever .

History

Founded in 2000 by Deep Kalra, MakeMyTrip.in had its beginnings in a small office in Okhla, New Delhi. Deep Kalra, formerly V.P. Business Development for

GE Capital had the mandate to develop and partner new distribution channels for the company's consumer financial products. The internet appeared as an interesting choice with untapped potential and his role at GE Capital provided him the opportunity to be closely involved with the then nascent internet industry in India. Shortly thereafter, Deep began considering his entrepreneurial options, interested in a couple of sectors of the Indian economy, including travel. When he found that the travel industry lent itself seamlessly to the Internet and had tremendous potential as a sector, MakeMyTrip.com was conceptualized.

Deciding that the Indian market was not yet ready or an online travel agency, MakeMyTrip.com instead concentrated on the US India travel sector. In a relatively short span, MakeMyTrip.com grew to emerge as a major travel website in the US to India sector, and today has an approximate 4% share of the NRI market, which is pegged at Rs. 4500 crore (USD 1 billion). With the revolution in the Indian travel industry caused by the emergence of the domestic Low Cost Carriers, MakeMyTrip launched its website for the Indian travel market in September 2005. In its first year of operation, it was India's largest e-commerce company. According to MakeMyTrip's Company Profile, "the company is on track to achieve sales of INR 2500 crores (approximately US$ 500 million) in the financial year ending March 2010, making it India's largest travel company."

Products and Services

Calling itself a one-stop travel shop and the most comprehensive Online Travel Agency in India, MakeMyTrip.com offers the following products and services:

- International and Domestic - Air Tickets, Holiday Packages and Hotels
- Domestic - Bus and Rail Tickets
- Private Car and Taxi Rentals
- MICE (Meetings, Incentives, Conferences & Exhibitions)
- B2B and Affiliate Services

These products are offered via the MakeMyTrip.com website, as well as at the 20 company-owned travel shops in India, and now also through new franchisee outlets opened in selected cities across India. All of MakeMyTrip.com's products and services are said to be supported real-time by 24x7 call centres.

Board of Directors

Board of Directors of MakeMyTrip comprise investor and independent board members. Financial Investors include SAIF Partners, Helion Venture Partners, and Sierra Ventures. Independent Members comprise such illustrious entrepreneurs and travel professionals as Philip C. Wolf (President and CEO of PhoCusWright Inc.), and Frederic Lalonde (Founder and CEO of Openplaces.org).

Framework of Transaction

Search ⟶ Select ⟶ Review & Payment

Sources of Revenue

The Sources of the Revenue is primarily depends on the commissions, incentives and the service fees which they get from Airline Companies, Indian Railway, Cruise Operators, Bus Operators and Hotel Owners. Service fees for provision of B2B and affiliate services is also an additional source of income for the company which has a huge potential. Some part of revenue also comes from the advertisement hosted on the www.makemytrip.com by advertising agency and ministries to promote the tourism in the particular state and country.

The commissions usually vary between 4-10%* per ticket and incentives on maximum number of bookings or achieving the sales targets of the airline companies. For hotel bookings, it varies from 10-15%* per Bed booked.

*vary depends on the airline, place of booking and the route for which the booking has been made.

Financial Analysis

With nearly half a billion US dollars in gross bookings, MakeMyTrip is the largest online travel company in India and its primary website,

www.makemytrip.com, is the country's second-most visited travel website, with over 1.7 million unique visitors per month (it trails only the Indian Railways' website). As an intermediary, the company focuses on net revenues, which grew 62% in the latest fiscal year to $60 million and outpaced 42% industry bookings growth. The company also turned EBITDA positive in its fiscal 2010 ended March ($2 million), aided by a mix shift to highermargin hotels and packages business.

With India's travel and tourism market expected to double in size by 2020, MakeMyTrip will need to make only incremental investments to support additional website traffic, and though outsourced call center costs should scale with higher volumes, it should gain strong leverage on sales and administrative overhead. In other words, the company's margins are in line to get an upgrade from coach to first class.

IPO take off

With five million shares worth $70 million in an initial public offering, MakeMyTrip.com recently went public with a bang when it began trading on the NASDAQ global market. The company says MakeMyTrip's IPO listing on NASDAQ is a major step forward for the industry as it marked the first IPO by an OTA player in the country. "The Indian OTA industry has been gradually growing over the past few years and this year the industry has witnessed many key events," Deep Kalra, CEO, MakeMyTrip told EyeforTravel's Ritesh Gupta in an interview. "As per PhoCusWright, the Indian online travel market will be US$6 billion by the end of 2010. So the sector is surely booming and registering growth." Kalra,

Simple Registration

Just fill up a simple form and get a username and password to access the website and get book your tickets, holiday packages online.No Fees for registration

Recent developments

MakeMyTrip.com has expanded its footprint in India by adopting a Hybrid Online Travel Agency (OTA) Model, with 20 regional offices across the country, apart from several franchise offices. This is intended to
help the company serve those customers who prefer making their travel and holiday plans directly in person with the travel expert, rather than through the telephone, real-time chat, or e-mail channels also offered by the company.In February 2007, Amadeus IT Group announced that MakeMyTrip had chosen Amadeus as technology provider. In August 2007, the company allied with Nokia to let customers book air tickets on their mobile phones. In March 2011, MakeMyTrip underwent re-branding, wherein its brand tagline/slogan was changed from **Wish, Click, Go** to **MEMORIES UNLIMITED**.

Acquisitions

MakeMyTrip has bought strategic assets from Ticketvala including website, URL, technology platform agent network, and bus inventory.

Business Challenges

As the first and only comprehensive online travel site with real-time booking for flights, hotels, cars, and holiday packages, MakeMyTrip heralded a significant change in the way consumers purchased travel services in India. After its successful launch, the company has led the market with innovative products and services, consolidating its position in the market as a brand recognized for its reliability and transparency.

The portal sells more than 12,000 flight tickets, 1,000 hotel room nights, and 100 holiday packages every day. MakeMyTrip attracts more than 3.5 million unique visitors every month. In financial year 2010, the company achieved approximate sales of Rs 22,000 crore (approximately U.S.$478 million), reinforcing its position as the market leader with 48 percent market share*. As business grew, so did the challenge of keeping the portal accessible to ensure a positive user experience, The legacy infrastructure that MakeMyTrip had in place struggled to cope with the added traffic. "It was unable to manage the traffic efficiently, and it was passing a lot of the load, such as session and connection management, back to the server, resulting in high drop-off rates," says Sanjay Kharb, Assistant Vice President – Technical Operations, MakeMyTrip (India) Pvt Ltd. "MMYT were also seeing heavy loads on the SSL server."

Having an agile IT infrastructure is vital for the company to meet its business objectives and gain an edge in a highly competitive market. To increase sales and revenue, it needed to increase user conversion rates. MakeMyTrip did so by delivering relevant content to its visitors, based on their

profiles, preferences, and locations. Because the portal gets incentives from airlines based on the number of hits with bookings, MakeMyTrip was looking for a way to reduce the number of users who use the portal only to perform searches, which results in no revenue.

"Some users visit the site in the morning and come back again in the afternoon to search for deals. In order to convert these visits to transactions, MMYT needed to track these cookies and users to determine if MMYT should offer better deals or give them something on their return visits," says Kharb.

" With the F5 Application Delivery Controller in place, our system load has decreased by up to 30 percent and there are no more failures at the back end." - Sanjay Kharb, Assistant Vice President – Technical Operations, MakeMyTrip (India) Pvt Ltd

The overall purpose of tracking users is to generate more business. Just a 1.5 to 2 percent increase in conversion rate (number of transactions vs. number of sessions) can amount to a great deal of additional revenue. MakeMyTrip's aim was to use technology to achieve the highest amount of revenue with the lowest amount of resources.
Being a technology savvy and forward-looking company, MakeMyTrip wanted to optimize its resources and achieve higher return on investment on its IT outlay. To achieve these, it needed a single solution that effectively served multiple purposes, such as load balancing, SSL VPN, and caching.

Solution
Having benefited from using F5 solutions previously in his career, Kharb decided to consider F5 and a couple of other vendors to deliver the new solution. Each of the three shortlisted vendors provided a proof-of-concept based on MakeMyTrip's criteria of solving the traffic bottleneck problem, viability, and meeting the portal's long-term vision. "MMYT also wanted a solution that could give us technological enhancements such as web security and customizability," said Kharb. Following the proof-of-concept, F5 BIG-IP Local Traffic Manager (LTM) was chosen for its performance, versatility, and flexibility. The F5 BIG-IP platform is a cost-effective, intelligent Application Delivery Controller (ADC) that lets customers add on-demand capacity and processing needs as required by their users, applications, infrastructures, and businesses. F5 ADCs are also modular, allowing customers to add new funcOonality—everything from **web security** to topologybased load balancing— enabling faster response to changing business challenges. Four of these Application Delivery Controllers were deployed at the portal's two data centers—one operational and the other as backup—at the end of 2008. The new devices deliver the inventory application, which was developed in-house based on Open Systems.

Benefits
The F5 solution has enabled MakeMyTrip to handle its increased traffic, provide a better user experience while increasing revenue, and be poised to use additional F5 technology for future initiatives. **No more load balancing issue ,**According to Kharb, the company's web traffic problems were solved following the switch to F5. "We no longer have load balancing or SSL server overload issues. The F5 appliances have a capacity of 20,000 transactions per second on SSL, which is enough for us," says Kharb. "With the F5 BIG-IP LTM devices in place, our system load has decreased by up to 30 percent and there are no more failures at the back end. Drop-off rate went down by four to five percent."

Higher conversion rate
MakeMyTrip has also been able to track users and their search patterns using the F5 easy-to-learn scripting language, iRules,® to customize how the BIG-IP devices intercept, inspect, transform, and direct inbound or outbound application traffic. This move has resulted in a higher conversion rate.

Going forward
As part of its plans to enhance its services, MakeMyTrip is looking to upgrade its existing F5 ADCs to advanced F5 ADCs. These come with quad-core processors that enable support for multiple BIG-IP modules, such as BIG-IP® Application Security Manager™ and BIG-IP® WebAccelerator,™ within a single unified device. "MMYT are also experimenting with F5 geolocation functionality, which uses the location database to map IP addresses to geographical locations. That way, we can identify IP addresses and intelligently deliver customized content based on where the user is located," said Kharb. "F5 is not just a technology, it's a cost-effective, unified solution**."**

Awards & recognitions

Since 2000, MakeMyTrip has won several awards and accolades:

Travel & Business

- 1st Rank in Great Places To Work – 2010 (Industry – Professional Services)
- 2nd Rank in Great Places To Work – 2010 (India)
- Superbrand India – 2009-10
- Great Places To Work – 2009 (Industry – Professional Services)
- Most Preferred/Best Travel Portal – CNBC Awaaz 2009
- Most Visited Travel Website – comScore – 2005-09
- Most Preferred Online Travel Agency – Travel Biz Monitor Survey – 2008
- Number One Online Travel Agency – JuxtConsult – 2008
- Red Herring 100 Asia 2007
- Gold and Silver – Abby Award – 2006-07
- Among the Top Ten Websites visited by Indians – comScore – 2007
- Nominated World Travel Awards – Asia's Leading Travel Agency – 2007
- Among 100 IT Innovators – NASSCOM – 2007
- Best Online Travel Company – Galileo Express Travel World – 2007
- Emerging India Award – ICICI Bank & CNBC TV18 – 2006
- Asia's Hottest Technology Startup – Red Herring – 2006
- **Airline Awards**
- Air Canada – Outstanding Performance – 2008
- Singapore Airlines – Top Passenger Agent – 2007-08
- British Airways – Outstanding Revenue Contribution – 2007-08
- Air Mauritius – All India Top Ten Agent//Top North India Sales Award – 2006-07//2007-08
- Cathay Pacific – Outstanding Performance – 2007
- Malaysia Airlines – Top Agent Award – 2007
- Lufthansa – Outstanding Performance – 2006-07
- Kingfisher Airlines – Outstanding Performance – 2006-07
- Indian Airlines – Achieving Highest Domestic Passenger Sales – 2006-07
- Air India – Outstanding Contribution to Passenger Sales – 2005-06
- Jet Airways – Award of Excellence – 2005-06
- Gulf Air – Continuous Support

REFERENCES

i. www.makemytrip.com
ii. www.limeonline.in/pdf/ISB.pdf
iii. www.alletec.com/pdf/case_studies/nav/makemytrip
iv. www.f5.com/pdf/case-studies/make-my-trip-cs.pdf

Global Journal of Enterprise Information System
Jan 2011–March 2011
Volume-3 Issue-1

Greening the Supply Chain: A Guide for Asian Managers

By

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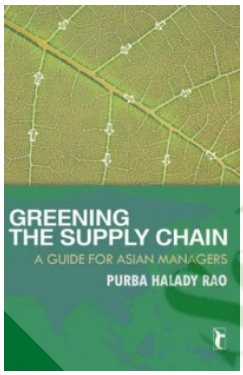
ABSTRACT

This book would be useful reading for entrepreneurs, consultants and practicing managers committed to sustainable environmental management. This book is also apt for the government policy makers, private and public sector industrial development planners and new breed of managers so that they can contribute to the sustainable environment. The book has been written in an easy to understand language with many examples from live case studies spreading all over south and South East Asia countries.



Price : INR 350.00
ISBN No.: 9788178298764
Year : 2008
Pages : 284
Publisher: Sage/Response Books

KEYWORD

Environment	East asia countries
Sustainability	Reverse logistics
Closed-loop	Global companies
Environmental pollution	Global warming

With the on-going buzz on environmental consciousness and corporate responsibility towards the planet Earth, firms are trying to develop innovative ways to make improvements in their environmental performance. Mostly all global companies are taking keen interest in embracing the concept of greening the supply chain and aim to become environmentally responsible companies. Successful companies are giving a sincere contemplation at the processes and operations as supply chain is where companies are involved in moving, making, storing and throwing away the things. By adopting green practices in supply chain, these companies are integrating with other stakeholders so as to minimize carbon, wastewater, packaging, hazardous substance, and related footprints. This has enabled them to make better, more informed decisions about organization's environmental footprint. At the same time the firm's objective is to reduce a company's impact on the environment while improving business performance. They are getting benefitted by improved productivity, increased efficiency, reduced waste, lower capital requirements and enhanced product development.

The author feels that a suitable environmental policy can be solution to the global warming and environmental pollution happening at various stages of production and operations. She also feels that there is a need for adopting environmentally focused practices while managing a supply chain by integrating the suppliers, business partners, and consumers in their greening initiative for ensuring social sustainability. The book also sets the stage for effective integration of suppliers, business partners, waste handlers and consumers in the move towards a green environment. It explores how different types of environmentally sustainable practices should be adopted at different stages of supply chains. It details how various companies have greened their supply chains by adopting innovative measures for ushering green practices right from supplier selection to material receipt.

The whole book is divided into six chapters where chapter one gives the introduction of greening the supply chain and its impact on the business environment. It has its positive impact on Health and Safety, small and medium enterprises and social sustainability. The second chapter discusses about the greening the inbound logistics phase. It highlights the importance of green sourcing and green purchasing and leading companies to green their suppliers. The

following chapter looks at the production phase using pollution prevention; resource conservation and utilizing the concept of reduce, reuse and recycle in company operations. The next chapter focuses on outbound logistics phase involving waste disposable management, transportation, delivery logistics, packaging and green marketing. This also extends to understanding green consumer behavior, redesigning old products and services and launching new products and packages that are environment friendly and advantageous to consumers. The penultimate chapter discusses about the need of reverse logistics and the importance of closed-loop, waste free and conservation focused supply chains. The last chapter explores eleven case-studies where various companies have incorporated environmental management into its operations and contributed towards environmental sustainability.

http://www.alibris.co.uk/search/books/isbn/9788178298764

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Sohail S. Chaudhry is a Professor in the Department of Management and Operations/International Business, Villanova School of Business, Villanova University, Pennsylvania, USA. He received his Ph.D. in Industrial Engineering and Operations Research from the School of Engineering and Applied Sciences in 1985 from Columbia University in the City of New York.

Professor Chaudhry has published more than 45 refereed journal articles which have focused on many different aspects of the supply chain in enterprises. His research encompasses areas such as network location, supplier selection, management and control of quality, constrained inventory, application of genetic algorithms to business problems, and systems theory, among others. His research has appeared in journals such as Annals of Operations Research, Computers & Operations Research, Enterprise Information Systems, Expert Systems: The Journal of Knowledge Engineering, Decision Sciences, European Journal of Operational Research, Information System Frontiers, Journal of the Operational Research Society, International Journal of Quality and Reliability Management, International Journal of Production Research, Management Science, Omega, Production and Inventory Management Journal, and Systems Research and Behavioral Science. In addition, Professor Chaudhry has presented over 65 papers at conferences around the globe as well as edited 3 volumes of Confenis conference proceedings which were published by Springer.

At the professional level, Professor Chaudhry serves as an Associate Editor for Enterprise Information Systems and also, serves as a member on the Editorial Advisory Boards of Journal of Academic Research in Economics, Studies in Business and Economics, SEFBIS Journal, International Journal of Computing & Information Technology, Production and Inventory Management Journal, and International Journal of Operations and Quantitative Methods.

The teaching interests of Professor Chaudhry are in the areas of Operations and Supply Chain Management. He has taught at various institutions including Columbia University, Loyola University Chicago, University of Wisconsin – La Crosse, Denmark's International Study Program Copenhagen, Temple University Japan, and European Business School, Germany. Also, he has lectured at Beijing Jiaotong University and the Institut Suprieur de Gestion de Sousse, Tunisia. Moreover, he is affiliated with the Institute of Management Technology – Dubai and Abu Dhabi University as a visiting Professor. For the last decade, he has been using distance learning platform to teach quantitative courses to undergraduate and graduate students. Furthermore, he has developed business programs for undergraduate students with International University Geneva, Switzerland and Quinn School of Business at University College Dublin, Ireland as well as a graduate program with Institute of Management Technology - Dubai, United Arab Emirates.

On a personal level, Professor Chaudhry has traveled to more than 40 countries over 4 continents on academic and personal trips. To relax, he likes to innovate in the kitchen and recreationally, he plays badminton at a competitive level. Furthermore, he is an avid viewer and attendee of the various forms of cricket when the opportunity arises during his travels.

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Volume-3 Issue-1

Jan 2011-March2011

Biographical Note of the Luminary in an Area of IS

Global Journal of Enterprise Information System

Jan 2011 –March 2011

Volume-3 Issue-1

Eacademy – Exclusive Business networking for the digital age

By

Editor-In-Chief, GJEIS

ABSTRACT

Ecademy is a membership organisation for entrepreneurs and business owners who belong to a community that connects, supports and transacts with one another. Ecademy has trail-blazed and pioneered the need for businesses to engage online in a trusted, safe environment and embrace the new digital age. Providing a platform for businesses to learn, network and develop and a peer to peer knowledge exchange through blogging and boardroom events. Ecademy is recognised as the premier online network for businesses to keep up to date with their networking and social media skills as both now go hand in hand. To ensure quality connections and results, Ecademy have developed the tools, resources and events since 1998, to ensure a small to medium business can quickly and effectively find the right kind of people it needs to grow. Ecademy allows you to attract professional people you would like to meet 24 hours a day from your office or home.

ecademy

connecting business people

www.ecademy.com

FOUNDER

Thomas Power

Chairman

thomas.power@ecademy.com

Ecademy is a membership organisation for entrepreneurs and business owners who belong to a community that connects, supports and transacts with one another.

Know Me, Like Me, Follow Me

Ecademy philosophy

=Know Me - Utilising Social Media and to be visible and understood
=Like Me - Engaging on Social Networks to be part of the conversation
=Follow Me - Serving and supporting your followers to maintain attention

Know Me, Like Me, Follow Me provides simple learning steps - included in your membership - to guide you on how to get a return on investment from Ecademy, social media and online networking for your business.

To ensure quality connections and results, Ecademy have developed the tools, resources and events since 1998, to ensure a small to medium business can quickly and effectively find the right kind of people it needs to grow.

ecademy DIGITAL SCHOOL

In September 2010 we launched Ecademy Digital School to address the needs of small businesses in the Digital Age. The school trains professional people, business mentors, advisors and coaches on how to relate to the shifting world of online commerce. Known as Digital Coaches, Ecademy is creating a group of people, called Ecademy Digital Coaches who can help with business strategy and planning to ensure their online time is well spent and that they build a supportive, social and positive brand online.

Digital Business Britain Manifesto

March 10th 2011 Ecademy launched their Digital Business Britain Manifesto, led by Penny Power, Ecademy Founder, Ecademy want to manifest a better British Economy through greater employment of youths, greater skills within Small Businesses and a focus on the ethical delivery of communication, stamping out adult bullying and harassment that prevents many small businesses from

The Ecademy is a Limited Company No. 03651083 registered at 80-83 Long Lane, London, EC1A 9ET. VAT No. 718037736. The company had it physical presence at Aumara, Headley Road, Grayshott, Hindhead, Surrey, GU26 6LG.

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www.karamsociety.org

Global Journal of Enterprise Information System

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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Blockchain Federation of India

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National	₹ 1800	₹ 4000	₹ 6000	₹ 50,000	₹ 1,00,000	₹ 2,00,000
International	$120	$ 200	$300	$1000	$ 1500	$2000
Membership years run 1st January to 31st December of every year						

Please check appropriate registration fee for BFI:

- Student BFI Member ☐
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Global Journal of Enterprise Information System
Scholastic.seed@gmail.com
Editor-in-Chief : Dr. Subodh Kesharwani
Online ISSN : 0975-1432 | Print ISSN : 0975-153X
Frequency : Quarterly | Published since : 2009
Publisher(s) : KARAM Society & Scholastic Seed Inc.

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WE JUST WANT TO SAY... THANK YOU!

10 Incredible Years of GJEIS 2009-2019

To,

Prospective Contributors & Researchers
Global Journal of Enterprise Information System
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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]

13. Award is something given to a person or a group of people to identify their fineness in a definite field especially in an area of EIS, it is rather a certificate of excellence for their contribution in academia or in a corporate world. This start throws a light on an entity or a gamut of researcher who had been honored for their extra ordinary input. [Limit 2 Pages]

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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About New Submission Policy (NSP) 2019

The NSP-2019 consists of following features:

1. Paper will be strictly submitted online at : **www. gjeis.com**
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3. It is mandatory for Indian authors to submit research article along with a foreign co-author as a first author or corresponding authors due to journal global in nature characteristics and its wide international presence and listing in various directories across the globe. The submission by the foreign authors will fulfill the global mandate of journal and facilitate in listing and enhanced impact factor in future course of action. Though the journal have been listed in various directories and had a good impact factor but we expect in 2019 to be listed in few leading indexing.
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.
5. From April 2019 we are putting a Reviewer comment in a Paper under Category Called: Anonymous Reviewer-1, Anonymous Reviewer-2, and Anonymous Reviewer-3. Though tracking record from Submission to online first would depict with various dates in a paper. Visit sample article and reference style. Journal also publishes a similarity index detail of ithenticate plagiarism report at the end of an article.

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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.

GJEIS have developed fast-track peer review options to restrain some of the needless instance that lapses between a manuscript being submitted and its periodical. GJEIS Fast Track Publication service which better known as FTBS is an **"optional service"** which provides author a platform to publish their papers in **just 9 weeks**, usually a journey time from submission to publication takes 12 Months. The purpose of creating **FTPS** is to facilitate the author in publication of their paper in a prescribe time frame and do all the process in a fast track mode without compromising with quality. There are certain prerequisites which are mandatory to include under FTPS:

- ✓ Article should be Plagiarism Free and pass the Originality Test by http://www.ithenticate.com (Prevention Plagiarism tool) with similarity test index below (10%)
- ✓ Expedited review will be offered, on request, for submitted research articles after the editorial board consist of 5 members approved.

GJEIS has started a non-compulsory speedy examination for fast-track publications to draw attention to noteworthy developments in the various fields of the academic research without compromise with superiority. GJEIS goal is to endow with the research group of people with rapid and on the spot entrée to freshly completed research works in a variety of research vicinity that are speedily developing with great impending impact. The research community as a whole advantageous from the realism that primary edge research is made reachable to a extensive audience more punctually. Kindly note that we acknowledge a limited number of the article under fast track in one quarter due to it's frequency and further email journal's primary contact for the inquiry. After receiving express review request for the article, we will tell to our contributor in a week time whether we can offer rapid review for the submission or not. If we decide not to we may offer to think about your paper either in the normal mode or provide you date from when we can consider it under rapid review.

FASTTRACK Publication Service

There are certain amount attracted by the author if they avail this FTPS service, which is not pre-decided but based on the article creditability and its testimonial, nonetheless it takes into contemplation the following cost levied:

1. Fast track Plagiarism check Cost
2. Suggest method to rectified plagiarism and facilitating the same
3. Facilitate in reviewing the article by the in-house team of experts and 6 subject expert reviewer (3 India & 3 Abroad)
4. Research Orientation by the subject expert and help in connecting and navigating
5. Subscription Cost of a Journal both Print & Online
6. Given the number of high quality submissions and the associated production costs, we are only able to grant a limited number of FTPS waivers and discounts, with priority given to some first generation students residents.

Waiver from Cost Occurred under FTPS

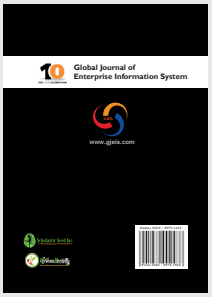
- If the Editorial Board thinks that the submitted articles are exceptional in nature and sound good amount of research then to facilitate and acknowledge the author, editorial board automatic initiate waiver partially or fully by exempting fees levied under FTPS. Thus these academic responsibility initiatives 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
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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

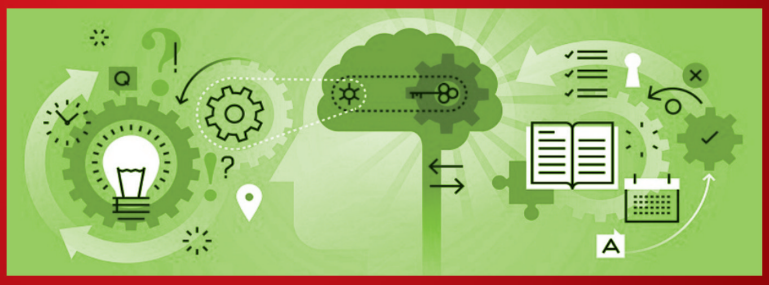
DO's AND DON'T

- 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.
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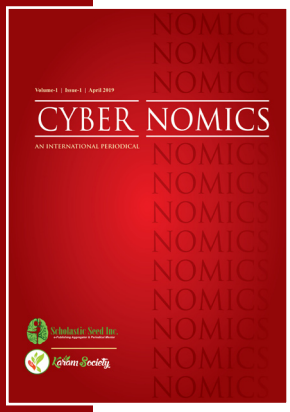
- Call For Paper Arrangement of Article Plag Check, Interaction with Author, Proof Reading
- Other Indexing would be done by the society/ Scholastic Seed Inc. time-to-time, but other expenditure incurred would intimate and levied accordingly if charge by the agency on time-to-time basis.
- Process for 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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Online ISSN : 0975-1432

Print ISSN : 0975-153X

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