EFFECTIVENESS OF KNOWLEDGE MANAGEMENT SYSTEMS –AN EMPIRICAL STUDY OF TEXTILE INDUSTRY OF PUNJAB

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ABSTRACT

Knowledge management systems are generally computer based systems which are primarily designed to support the implementation of knowledge management within the firm. This includes various activities namely knowledge creation, transfer and sharing. This paper aims to find effectiveness of km systems in textile industry of Punjab. The study finds that km systems need to be reviewed in majority of the units to make these more effective.

Keywords : *Knowledge management, Effictiveness, Textile industry, Knowledge harvesting.*

INTRODUCTION

Knowledge management system is a computer-based system that supports the implementation of knowledge management within firms, so that distribution and accessing of knowledge becomes more efficient and effective (Rachman, 2007). Many benefits to be gained from the application of knowledge management systems include (Beijerse,1999): improving efficiency, improving market position, improving corporate sustainability, improving corporate profits, optimize the interaction between product development and marketing, improving the competence of the group, making learning professionals more efficient and effective, providing a better basis for decision making, improve communication between knowledge workers, increasing the synergy between knowledge workers and make companies focus on core business issues.

It is important to know the effectiveness of the knowledge management system in a company as it provides a basis for company valuation, stimulate management to focus on what is important and justifies the investments in knowledge management related activities. The objective of this study has been designed keeping all these factors in mind.

Methodology and Findings: To study the effectiveness of knowledge management systems in textile industry of Punjab, twenty four textile units have been selected. The units have been classified in three categories namely G1 (with turnover up to 200 crores), G2 (with turnover from 201 to 500 crores) and G3 (with turnover of more than 500 crores). Data has been collected from people concerned with top management. The sample size is 240. Well structured questionnaire has been used to collect the data which has been designed after extensive study of literature and discussions with experts. Five point Likert scale ranging from (5) 'strongly agree', (4) 'agree', (3)

'neither agree nor disagree', (4) 'disagree' and (5) 'strongly disagree' has been used to rate the response. All the comparisons are made with one way ANOVA.

During the study, following findings have been made:

Best Techniques for Knowledge Creation: Various techniques are used in industry for knowledge creation. Effectiveness of each technique varies for different companies. As seen from the table 1 environmental scanning seems to be the most effective technique (overall mean score is 4.17). Categories wise score indicate that G1 has rated it to be most effective followed by G2 and G3 respectively (mean scores are 4.31, 4.25 and 3.86 for G1, G3 and G2 respectively).

Without taking into account relevant environmental influences, a company cannot expect to develop its strategy. For an organization to survive and prosper, the strategists should master the challenges of the profoundly changing political, economic, technological, social, and regulatory environment. To achieve this broad perspective, the strategists develop and implement a systematic approach to environmental scanning. As the rate and magnitude of change increase, this scanning activity is intensified and directed by explicit definitions of purpose, scope, and focus. This finding is supported by many studies.

Newgren *et al.* (1984) compared the economic performance of twenty-eight US corporations that practiced environmental scanning with twenty-two non-practicing firms. Performance was measured over a five-year period (1975-1980) using the firm's share price/earning ratio, normalized by industry. Data analysis showed that scanning firms significantly outperformed non-scanning firms. The average annual performance of the scanning firms was also consistently better than the non-scanning firms throughout the period. The study concluded that environmental scanning and assessment has a positive influence on corporate performance.

Scanning also benefits small businesses. In an in-depth case study of environmental scanning at the Georgia Center for Continuing Education, Murphy (1987) concluded that scanning is an important component of the organization's strategic planning process, improving the Center's ability to react to and implement change in response to external

Table 1. Best techniques for knowledge creation in different sized categories of textile industry

Best techniques for knowledge creation	G1		G2		G3		Overall		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F-ratio
Environmental scanning	4.31	0.72	3.86	1.00	4.25	0.84	4.17	0.85	1.08
Data mining/Text mining	3.85	0.87	3.86	0.84	3.75	0.84	3.83	0.85	0.19
Business simulation	3.31	0.61	3.57	0.73	3.50	0.51	3.42	0.64	0.61
Content analysis	2.85	0.62	2.81	0.67	3.30	1.09	2.92	0.75	1.30
Total	14.32	1.23	14.10	0.98	14.80	1.29	14.33	1.19	1.45

factors. Furthermore, scanning has also contributed to increased communication among the line and staff personnel of the organization, and greater employee involvement in the decision making process.

West (1988) examined the relationship of organizational strategy and environmental scanning to performance in the US foodservice industry. Data was collected from sixty-five companies over a period of 1982 to 1986. The study found that strategy and environmental scanning had a substantial influence on the firm's return on assets and return on sales. High-performing firms in both differentiation and low cost strategies engaged in significantly greater amounts of scanning than low-performing firms in those two strategic groups. Daft *et al.*'s 1988 study of scanning by chief executives found that executives of high-performing firms (those with higher return on assets) increased the frequency, intensity, and breadth of their scanning as external uncertainty rose.

Ptaszynski (1989) examined the effect of the introduction of environmental scanning in another educational organization. The study found the scanning to have a positive effect on the organization in these areas: communication, shared vision, strategic planning and management, and future orientation. The most significant effect was that scanning provided a structured process which encouraged people to regularly participate in face-to-face discussions on planning issues. As a result, the organization was able to develop a number of strategic options that could be used proactively to cope with external change. Subramanian and his associates studied scanning and performance in US Fortune 500 companies and found support for a relationship between performances, measured by profitability and growth, and advanced scanning systems: firms using advanced systems to monitor external events showed higher growth and profitability than firms that did not have such systems (Subramanian *et al.*, 1993).

Data mining with mean score of 3.83 is second most popular technique in textile industry. This finding too is confirmed by the various studies that prove that an organization encompassing data mining techniques can enjoy a number of benefits; these include understanding customers' behavior, making a judgment on the effectiveness of the company's web site if there is one, and benchmarking marketing campaigns (Doherty, 2000; Mena, 1999).

The study conducted by Folorunso and Ogunde (2004) concludes that the process of extracting knowledge hidden

from large volumes of data (data mining) has proved very successful in solving many business or scientific problems to achieve competitive advantage. The Data Mining model can be deployed on the massive data collected from past business processes of the organization which then yields the much needed previously unknown knowledge and trends needed by top managers or decision makers in the organization for effective business process redesigning.

Business simulation in spite of its advantages involves very high cost. As seen in table 1, it is not much popular for knowledge creation. Content analysis is an effective tool but this technique being complicated is not commonly used in the textile industry (overall mean score 2.92).

The Best Technique for Sharing and Learning Knowledge

After thorough analysis of knowledge captured or created, it needs to shared and transferred to individuals to encourage learning. There are different techniques being used for this purpose. Table 2 presents one way ANOVA calculations regarding the best techniques of knowledge sharing as rated by three groups: G1, G2 and G3.

Table 2. Best techniques of knowledge sharing in different sized categories of textile industry

Best techniques for knowledge sharing	G1		G2		G3		Overall		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F-ratio
After action reviews	4.38	0.74	4.29	0.70	4.75	0.44	4.42	0.70	1.17
Identifying and sharing best practices	3.68	1.03	3.69	0.73	3.35	0.86	3.63	0.93	1.24
Communities of practice	3.08	0.79	2.96	0.20	3.20	0.85	3.07	0.69	0.97
Story telling	2.85	0.54	3.23	0.49	3.83	1.24	3.12	0.77	2.39*
White pages	2.92	0.48	2.93	0.97	3.00	0.96	2.94	0.74	0.42
Total	16.92	1.45	17.09	1.61	18.13	2.00	17.17	1.65	3.61**

**** Significant at 5%,* Significant at 10%**

It can be seen that overall mean value is maximum (mean score 4.42) for *after action review* (AAR) making it most popular technique for knowledge sharing. AAR consists of establishing a clear perspective of situation, task, purpose, and end-state to inform planning. Generally a Before Action Review is carried out to verify alignment on the intent and plan, anticipate challenges, and to establish a plan for execution. Following the action (or periodically throughout it), AARs dig into gaps between intended and actual results in order to identify causes - and commit to key "sustains" and "improves" for the next period of action. This cycle fuels learning and accountability by testing plans, assumptions and execution against actual results. It can be seen from table that it is rated to be most effective by G3 followed by G1 and G2.

I*dentifying and sharing best practices* is the second most popular technique used (as seen in table 2, overall mean score is 3.63). Category wise mean scores are 3.69, 3.68 and 3.35 for G2, G1 and G3 respectively, indicating that G1 and G2 have rated this technique more effective than G3. Identifying the organization's best practices helps its employees to learn from each other and reuse proven practices. Effective sharing of best practices helps an organization to raise the overall quality of services, improve operations at poorly performing units so that their performance more closely approaches that at the best units and avoid duplication of effort or "reinventing the wheel".

Table also shows that Communities of practice (CoP) is not a very common practice in majority of units as mean scores are relatively low (mean scores are 3.20, 3.08 and 2.96 for large, small and medium categories respectively). At the time of study online CoP existed in Trident only.

Story telling though is the third commonly used technique for knowledge sharing but it is not considered to be much effective. Table 2 shows that story telling is popular technique in G3 (mean score 3.83) unlike other two categories (mean scores are 3.23 and 2.85 for G2 and G1 respectively). In many firms like Cheema Spintex this technique is used only at the worker level and not for executives. From the value of F ratio it can be inferred that means are significantly different for *story telling* which is not considered effective by G1 as compared to G2 and G3.

White Pages are not at all used in any of the units (mean scores are 3, 2.93 and 2.92 for G1, G2 and G3 respectively). Exception has been Trident where at the time of study, the knowledge repository was being made and designing *White Pages* was on the agenda. This can be attributed to the findings related to limited use of company intranet in the textile units.

Best Technique for Organizing and Managing Knowledge: Table 3 shows that overall mean value is maximum (overall mean score 3.71) for *knowledge harvesting* (mean scores are 3.78, 3.69 and 3.53 for G1, G2 and G3 respectively) making it the most effective technique. The main reason behind this is that only required knowledge is obtained through knowledge harvesting. This saves lot of time as well as cost in acquiring and sorting out the relevant knowledge. Research also shows that collecting and sharing expert knowledge can produce a long-term competitive

Table 3. Best techniques of organizing and managing knowledge in different sized categories of textile industry

Best techniques for organizing and managing knowledge	G1		G2		G3		Overall		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F-ratio
Knowledge audit	3.56	1.11	3.51	0.94	3.45	1.22	3.53	1.08	0.27
Knowledge mapping	3.13	0.84	3.20	0.67	3.03	0.16	3.12	0.74	0.34
Knowledge harvesting	3.78	0.89	3.69	0.47	3.53	0.51	3.71	0.74	0.46
Intranet	3.26	0.75	3.29	0.46	3.40	0.88	3.31	0.70	0.52
Total	14.24	1.99	13.69	1.29	13.50	1.62	13.95	1.77	1.04

advantage for an organization (Nonaka 1994; Alavi and Leidner 2001; Tsai 2001; Lee and Choi 2003).

Knowledge audit is the second most effective technique for knowledge organizing and management (overall mean score is 3.53).

This finding is also supported by research. Burnett *et al.*(2004) contend that the results of a knowledge audit provide an organization with valuable information including: (1) the knowledge needs of the organization, (2) what knowledge assets are available and where they are located, (3) if knowledge gaps or bottlenecks exist, and (4) the knowledge flow within the organization. A side effect of conducting a knowledge audit is that people in the organization are stimulated to think more about the knowledge that is important to them. The greatest benefit of a knowledge audit is the resulting inventory of knowledge sources and flows. A major disadvantage of conducting a knowledge audit is the amount of time required to interview and observes the knowledge workers (Nissen, 2006).

Knowledge mapping and interanet are not considered to be effective techniques by majority of the units (overall mean scores being 3.12 and 3.31 respectively). From the value of F ratio it can be inferred that means are not significantly different for any of the categories.

Barriers in Knowledge Creation: Knowledge as input is not always captured externally. Expertise of an organization lies in the fact that how it creates knowledge from within using the technology as well as minds of its employees. Knowledge creation leads to innovation and incremental improvements resulting into competitive advantage of the company. Table 4 presents one way ANOVA calculations of scores of barriers in knowledge creation as recorded by three groups i.e. G1, G2 and G3.

The biggest barrier that the firms seem to suffer in knowledge creation is the inadequate reward for knowledge contribution (mean score 3.82). In most of the cases the pressure to innovate is very high from the top management but the reward is generally not considered as an option to encourage people to contribute knowledge. There is generally lack of extrinsic as well intrinsic motivation for employees. This becomes the biggest deterrent for knowledge creation or sharing.

F ratio indicates that there is significant difference in the mean scores of three groups (mean scores are 4.26, 3.88 and 2.85 for G2, G1 and G3 respectively). It is apparent that this problem is more pronounced in G2 and G1 whereas professional at G3 do not face such problems. This point towards knowledge oriented culture in G3 where employees are encouraged to adopt knowledge related behavior.

Research indicates that human resource management practices (HRM), based on motivations and incentives, is not only important but constitutes one of the most strategically relevant resources (Milgrom and Roberts, 1990, 1995; Baron and Kreps, 1999). New types of incentives and procedures permitting an efficient knowledge creation and sharing, within teams, are required to encourage people in a knowledge-based economy.

Stimulating creativity and sharing knowledge become essential and require appropriate HRM practices (Gupta and Singhal, 1993). Recent empirical evidence tend to prove that knowledge development and utilization can be facilitated by human resource practices (Leiponen, 2000; Laursen and Manhke, 2001; Laursen, 2002; Galia and Legros, 2005; 2006). Hinds (2003) also highlight the obstacles posed by sharing of knowledge. There are two things that cause delays in sharing experiences, namely: motivation and cognitive. The biggest problem in the sharing of knowledge is how to motivate community members to share knowledge. Motivation therefore is a key element in the sharing of knowledge and technologies only facilitate and expedite the process of sharing knowledge.

Resistance to change results into lack of receptivity to new ideas and adaptation. If top management shows this resistance , it can pose multiple problems like discouraging experimentation and innovation along with poor or no budgetary allocation for the same but such a problem is not observed in textile industry as the overall mean score for this is low (2.63). During the study it has been observed that respondents showed positive attitude towards management and many said that their management welcomed any new move that can be fruitful for the company. From the value of F ratio it can be inferred that means are significantly different for *resistance to change by top management* (G2 emphasizing it more than other two categories).

As far as poor budget and lack of understanding of customers is concerned, neither of these factors poses any

Table 4. Barriers in knowledge creation in different sized categories of textile industry

Barriers in knowledge creation	G1		G2		G3		Overall		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F-ratio
Poor understanding of customer needs	2.02	1.10	1.81	0.95	1.65	0.74	1.90	1.01	2.19
Resistance to change	2.38	1.08	3.14	1.47	2.50	1.52	2.63	1.32	3.61**
Skill shortage/lack of talent	2.69	0.91	2.71	1.29	1.73	0.45	2.54	1.05	3.17**
Insufficient budget for innovation/ research	2.46	1.01	2.90	1.12	2.25	1.10	2.55	1.08	1.67
Inadequate reward for contribution	3.88	0.53	4.26	0.74	2.85	1.33	3.82	0.90	5.11***
Insufficient information technology	2.16	0.79	2.06	0.48	1.55	0.50	2.03	0.70	1.84
Govt. regulations…. If any	2.77	1.12	2.57	0.91	2.55	1.15	2.68	1.07	0.73
Total	18.36	3.71	19.46	2.81	15.08	5.06	18.13	4.00	6.98***

** Significant at 5%, *** Significant at 1%

problem for knowledge creation. It is clear from the previous discussion that customers are most important for firms and this barrier if exists can be suicidal for the company. All the business moves depends upon knowledge bank related to the customers. All the knowledge creation relating to customer satisfaction is completely dependent upon this. Any misunderstanding in this context can lead to substantial losses. It has been found that even though top management does not reward for knowledge contribution, it does encourage experimentation has liberal budget (overall mean score for this variable is low: 2.55). This is an indication of positive attitude of top management. This is echoed by Holsapple and Joshi (2000) that the financial resources available to firm place a ceiling on knowledge creating activities. Increasing the financial resources available for knowledge creation may influence the quality of knowledge created, the quality of result or even the efficiency of knowledge creation.

Skill shortage results when there is dearth of talented people or under qualified people who can not be trained further to meet the technical and other requirements. From the table 4, it can be seen that overall mean score for skill shortage are very low, meaning thereby that there is no shortage of talent. F ratio indicates that G3 gives this factor least importance as compared to G1 and G2. In a state like Punjab where literacy rate and per capita income are high, it is not difficult to find people with right skills and talent. So companies do not come across such a problem most of the time.

Table 4 also shows that IT is not any problem for any of the categories. It therefore can be inferred that although textile units are not much techno savvy, these are well equipped with required IT and this never poses a problem in knowledge creation.

Further it can be seen from table that govt. and political environment does not have any effect on knowledge creation within the companies.

Characteristics of Existing Knowledge System: Though the formal organized knowledge set up is missing in majority of the organizations, still people talk of the knowledge and its importance in these trying times of cost cutting and recession. People at different levels are provided knowledge in different ways. For top and middle level, there are conferences and seminars, training sessions abroad, meetings with experts and availability of research journals and other relevant articles. For people at other levels, there are regular training sessions; various work improvement concepts like quality circles, Kaizen etc. which help sharing knowledge etc.

Table 5 shows that majority of the respondents do not seem satisfied with the existing knowledge system. Majority thinks that the existing system does not fit well into the existing culture (overall mean score is 3.28). Further F ratio indicates that the mean scores are significantly different for this variable in all three groups with lowest mean score in G3 (category wise mean scores are 3.42, 3.33 and 2.73 for G1, G2 and G3 respectively). This indicates that level of dissatisfaction among executives regarding current knowledge setup is higher in G3. As discussed before, G3 units are larger in size and operations. Their work culture is pro change and these units are professionally managed. Employees therefore have higher expectations and want a streamlined knowledge set up in their units.

Nonaka and Konno (1998) suggest that the knowledge creation involves social processes of socialization and externalization. Individuals hold certain beliefs and in the process of socialization these beliefs are shared and this becomes tacit knowledge. Whenever these beliefs are

Table 5. Characteristics of existing knowledge system in different sized categories of textile industry

Characteristics of existing KM system	Small		Medium		Large		Overall		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F-ratio
It fits into culture of the organization	3.42	1.05	3.33	1.26	2.73	1.09	3.28	1.14	2.41*
It is appropriate and needs no improvement	2.08	0.64	2.26	0.81	2.13	0.79	2.14	0.72	0.87
It meets knowledge needs of every employee	2.92	1.43	2.81	1.44	3.65	1.61	3.01	1.49	1.11
It is meant for people at all levels in the organization	2.97	1.21	3.06	0.84	3.25	1.32	3.19	1.20	2.51*
It is easily accessible to all depending upon the relevance of knowledge required	3.71	1.18	3.43	1.21	2.88	1.18	3.49	1.22	2.63*
It yields desired results	3.46	1.08	3.49	0.83	2.40	0.81	3.29	1.05	4.71***
It is efficient and quick to use	3.54	1.24	3.00	1.22	2.50	0.78	3.21	1.23	3.65**
It needs to be reviewed	4.15	0.54	4.20	0.73	4.10	0.84	4.16	0.65	0.56
Total	26.24	2.70	26.37	3.76	23.63	2.63	25.84	3.18	5.67***

***Significant at 1%, ** Significant at 5%,* Significant at 10%

externalized, this tacit knowledge becomes explicit knowledge. This indicates the importance of beliefs to value creation. A positive culture in an enterprise leads to higher value creation. Koudsi(2000) also agrees that the biggest challenge for knowledge management is not technical one but a cultural one. It is the difficult task of overcoming cultural barriers especially when the sentiment that holding the information is more important than sharing it (Anthans, 1998). This is supported by Reynold at the Delphi group in Boston who released a study in which 53 percent respondents cited culture as the biggest obstacle while deploying knowledge management (Cole Gomoiski, 1997).

In companies like Vardhman, Trident ,Nahar group, OCM, Oswal Woolen Mills, Jindal Cotex where there is no dearth of talented people who aspire to have good career growth and join the companies after getting education at premium institutes of the country, the existing knowledge system falls below their expectations. As textile industry is a traditional industry where the control of majority of the units is still in the hands of families, this response is an indication for the business to move towards change.

It is clear from the mean scores (overall mean scores are 2.14 and 3.01 respectively) that neither the existing knowledge system is appropriate, nor does it fulfill knowledge needs of every employee which leads to the conclusion of low knowledge penetration.

Table 5 shows that existing knowledge system is inappropriate for people at all levels of hierarchy (overall mean score for this is 3.19 which is relatively low). F ratio indicates that mean score for G1 is minimum in this regard (category wise mean scores are 2.97, 3.06 and 3.25 for G1, G2 and G3 respectively). It has been observed that knowledge is generally available for people at top or middle levels. Other employees have to approach their superiors for their knowledge needs. The solution is not always satisfying as the answers from each individual are not standardized and up to the mark. The outcomes stress on the need of improvement in the existing system.

As seen from the table 5 (overall mean score is 3.49), the existing knowledge system in whichever form it may be, is easily accessible to all. F ratio shows that means are significantly different for all three groups (mean scores are 3.71, 3.43 and 2.88 for G1, G2 and G3 respectively) i.e. G1 and G2 categories the scores give a positive indication meaning thereby that knowledge system is easily accessible to all. This may be due to small set up of units. But in G3 category the picture is gloomy (mean score 2.88). The larger set up, more intervening levels and higher expectations of the employees may be the reasons behind it.

Overall mean score for variable *existing knowledge system yields desired results* is 3.29 which are again low. F ratio shows that means are significantly different for three groups (mean scores are 3.46, 3.49 and 2.40 for G1, G2 and G3 respectively). It indicates that employees in G3 are most dissatisfied with the existing knowledge systems' tendency to yield desired results as compared to G1 and G2. This further highlights the scope of improvement in existing system.

Overall mean score for variable concerning *efficiency and speed of existing knowledge system* is 3.21. F ratio indicates that means regarding this variable are significantly different for three groups (mean scores are 3.54, 3 and 2.50 for G1, G2 and G3 respectively). Lowest mean score for G3 again shows maximum level of dissatisfaction over the efficacy of existing system.

It can be seen from table 5 that overall mean score for *need for improvement in existing knowledge system* is 4.16 which is significantly high. All the three groups seem to agree unanimously to this fact that existing knowledge system needs to be reviewed.

Conclusions: From discussions above, following conclusions can be made:

1. Environmental scanning is the best technique used for knowledge creation. This is followed by data mining.
2. The most effective technique of knowledge sharing is considered to be after action review. Sharing best practices is moderately important technique.
3. Knowledge harvesting is considered to be the most effective technique when it comes to organizing and managing knowledge. This is followed by knowledge audit.
4. Inadequate reward for contribution is the biggest barrier faced by most of the textile units which hinders the knowledge creation.
5. The existing knowledge system in all the textile units needs to be reviewed. Though the existing system is ranked moderately important as far as its accessibility is concerned. The efficiency, capacity to yield desired results, tuning with the existing culture, and its being meant for people at all levels is considered to be somewhat important. Its ability to meet knowledge needs of every employee is ranked low. This characterizes the low penetration of knowledge in most of the textile units.

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