Role of Knowledge Management Initiatives in Organizational Innovativeness: Empirical Findings from the IT Industry

Mary Mathew, Devaraj Kumar and Santhi Perumal

This paper addresses the relationship between knowledge management initiatives in Indian IT organizations and their innovativeness at the organization level by using the survey research methodology. Knowledge management initiatives were measured in the context of cultural, structural, and technological interventions. Innovation was measured in terms of organizational behaviour related to sensitivity, learning, newness, trialability, communicability, risk-readiness, and absorption.

A conceptual model was developed to assess the relationship between knowledge management initiatives and innovativeness. A hypothesis that knowledge management initiatives (KMI) influence the innovativeness of the organization was propounded. The questionnaire developed to assess knowledge management initiatives had 60 items, while an already available questionnaire consisting of 65 items was used to measure innovativeness. Eventually, the number of items in the knowledge management initiatives and innovativeness questionnaires was bought down to 45 and 34 respectively. Items were measured on a five-point Likert type rating scale, ranging from strongly agree to strongly disagree. The reliability of the questionnaires was checked using Cronbach Alpha.

The study was carried out on 84 professionals from 20 Bangalore-based IT organizations that had implemented knowledge management initiatives and had SEI CMM level 5. Means and standard deviations of the variables were computed. The variables were subjected to correlation analysis and factor analysis. A multiple regression analysis was done to identify the influence of knowledge management initiatives on organizational innovativeness. An organizational innovativeness score was used as the dependent variable and the variables of knowledge management initiatives were used as the independent variables.

The results of data analysis showed that the initiatives taken by companies to enhance their knowledge assets fall into the culture, structure, and technology subsystems and that all the three are highly correlated:

- Technology and culture are more strongly associated with each other, as compared to their association with structure.
- All the three KMI variables strongly influence organizational innovativeness, with ‘culture’ being the most important.
- ‘Learning climate,’ a variable of culture, is found to be the most significant of the variables to influence innovativeness. Hence, organizations that lay emphasis on learning and provide excellent training facilities can foster a more innovative environment.
- Interestingly, ‘risk readiness’ is not a factor contributing to innovativeness and is not significantly associated with the other variables.
- The variables like leadership, networking, reward and recognition, structure and technology do not significantly influence innovativeness.
Researchers are in search of how organizations can learn to master the art of innovation and manage its challenges. Questions that appear to have caught the attention of researchers over the years are: Does knowledge management have a role to play in innovation? And if so, what is the role of knowledge management in innovation? Although the researchers realized the centrality of knowledge in the innovation process, not many empirical studies have been carried out to determine the relationship between knowledge management and innovation. Perez-Bustamante (1999) states that knowledge is the cornerstone of intellectual capital and that there is an important correlation between technological innovation and knowledge management. Swan, et al (1999) considers innovation process as increasingly interactive and requiring simultaneous networking across multiple communities of practice. Castells (1996) observes that the current technological revolution has knowledge at its centre. Carneiro (2000) argues that innovation should be viewed as complex processes and that it involves a set of “investment’ possibilities. In the ‘investment’ perspective, knowledge is considered a capital. Kelly and Storey (2000) find lack of management of knowledge as one of the main barriers to innovation in service firms. Darroch and McNaughton (2002) elucidate that knowledge acquisition and responsiveness to knowledge are two important criteria for innovation to take place. All these studies increasingly point towards the critical role played by knowledge management in the innovation process. This paper aims to empirically study this relationship between knowledge management and innovation, specifically in the context of the rapidly growing Information Technology industry in India.

LITERATURE REVIEW

The review of literature is meant to identify potential variables that can be adopted to measure knowledge management initiatives and organizational innovativeness, and then establish a plausible empirical relationship between them, thus substantiating a relational theory.

What Constitutes Knowledge Management Initiative?

Knowledge management has increasingly been viewed as a competitive necessity (Romberg, 1998), a strategic resource (Earl, 2001), and the source of competitive advantage (Nonaka and Takeuchi, 1995). Such views suggest knowledge to be of strategic importance to business organizations. This has led to both academia and industry practitioners taking more efforts to gain insight into what constitutes a successful initiative of knowledge management. The result of such efforts is the discovery that culture, structure, and technology are factors responsible for the success of knowledge management practices. It can be deduced from the available literature that these factors interact to produce effective knowledge management practices. This synergy is evident from the work of Gallagher and Hazlett (2000). They report that knowledge management pervades culture, infrastructure, and technology in an organization. Chait (1999) observes that knowledge management involves culture, content, processes, and infrastructure in an organization. Davenport and Prusak (1998) state that there is a need for successfully navigating the political, organizational, and technological challenges coupled with change in the organizational culture for effectively managing knowledge. Organizations, particularly the knowledge-intensive ones, take various initiatives that affect all the three subsystems – culture, structure, and technology subsystems in order to exploit their knowledge assets. An organization’s efforts towards leveraging its knowledge assets are strongly influenced by the kind of initiatives undertaken in each of these subsystems.

Knowledge Management Initiatives: The Interaction among Culture, Structure and Technology

Research studies have shown that culture is a principal determinant of successful knowledge management initiatives. In an international best practice benchmarking study conducted by American Productivity and Quality Centre, it is found that knowledge sharing is tightly linked to a core cultural value of the organization and that sharing knowledge simply enables people to pursue that value more fully (APQC, 1999). As Reimus (1997) observes, when it comes to information sharing and facilitating more collaboration, the leading challenge to the organizations was – nothing to do with information or technology and everything to do with changing people’s behaviour. To overcome such barriers, the culture of the organization should be either strengthened or redesigned or changed before the organization embarks upon a knowledge journey.
Characteristics of Knowledge Culture

Involvement of Senior Management and Making Known the Corporate Vision

Inclusion of senior management in the knowledge management effort provides additional motivation for people to share knowledge and increases the chances of success of the knowledge management programme (Soliman and Spooner, 2000). Nonaka and Takeuchi (1995) are of the opinion that knowledge officers (top or senior managers) are the ones who generally give a direction to the organization’s knowledge creating activities. Gold, Malhotra and Segars (2001) point out that a corporate vision not only provides a sense of purpose to the organization, but also helps to create a system of organizational value. Corporate vision helps in aligning the knowledge management goals with the organization’s goals. This alignment enables both individuals as well as groups in the organization to clearly see the importance of sharing knowledge and this encourages knowledge sharing to become a way of life within the organization.

Organizational Learning

Senge (1990) observes that the rate at which the organizations learn may become the only sustainable source of competitive advantage. Learning in the organizational context is the accumulation of information in the form of knowledge (Argyris and Schon, 1978). Fiol and Lyles (1985) note that organizational learning entails the process of improved actions as a result of better knowledge and understanding. The learning process involves knowledge acquisition, sharing, and utilization (Huber, 1991) and it is the result of shared values and experiences that aggregates individual experiences into a corporate awareness (Henderson and Lentz, 1995). Learning alliances can speed capability development and minimize exposure to technological uncertainties by acquiring and exploiting knowledge developed by others (Grant and Baden-Fuller, 1995). Policies and strategies that help to retain knowledge are institutional mechanisms that are adopted with a view to enhance organizational learning.

Networking

Human networks are key vehicles for sharing knowledge. When several people are connected together, there are multiple pathways for the creation and flow of knowledge. Combining knowledge from different perspectives creates new opportunities and responses to challenges in innovative ways (Skyrme, 2001). These networks are typically composed of colleagues who share insights on topics they care deeply about. Such an information network is often known as communities of practice (APQC, 1999). In these communities, newcomers learn from old-timers. The benefits an organization could get out of fostering communities of practice are manifold. It is a method of decreasing the learning curve of new employees, responding more rapidly to customer needs and inquiries, reducing rework and preventing reinvention of the wheel, and spawning new ideas for products and services. Gold, Malhotra and Segars (2001) highlight the importance of a social system and argue that dialogue between individuals is the basis for the creation of new knowledge in organizations.

Reward and Recognition

Earlier research suggests that individuals in organizations will share information with others if such behaviour is positively linked to perceived rewards and negatively linked to penalties that are expected to result from such sharing (Thayer, 1967). The relationship between knowledge sharing and incentives was further supported by studies conducted by Quinn, Anderson and Finkelstein, (1996) and Gupta and Govindarajan, (2000).

However, experts are divided on whether rewards are effective for promoting a knowledge sharing culture in the long run. Tissen, Andiressen and Deprez, (1998) suggest that the only reason that professionals participate in knowledge sharing activities is the intrinsic reward that comes from the work itself. According to McDermott and O’Dell (2001), in some cases, formal rewards may be perceived as demeaning by professionals who are motivated by a sense of involvement and contribution.

Structure

Chong, et al (2000) report that one of the factors, which prevents knowledge management to add value to the business, is the hierarchical structure of organizations. One of the methods of overcoming this is to give importance to team work. The role of teams in facilitating knowledge flow has been highlighted well in the literature. Cross-functional teams are more creative as they are successful in drawing knowledge of members from different intellectual and occupational backgrounds. These views are supported by Brown and Eisenhardt (1995), who observed that cross-functional teams are more effective as
they leverage different perspectives from team members. Such teams are flexible and help the organizations adapt to demands of change in business environment.

**Technology**

Davenport and Prusak (1998) report that knowledge projects are more likely to succeed when they use technologies such as Lotus Notes and web-based intranets and that such tools provide opportunities for organizational learning and increasing functional specialization.

**Organizational Innovativeness**

Organizations that show innovative behaviour that is collectively exhibited by each of its subsystems such as technology, structure, processes, and people are said to possess organizational innovativeness. The subsystems may exhibit innovative behaviour of different types and to different degrees. In the past, studies on innovation and innovativeness were carried out, concentrating on a single subsystem or on some elements of the subsystem or at best concentrating on two subsystems to investigate organizational innovation and innovativeness (Ravichandran, 1993). However, such an approach to measure organizational innovation is not complete, as innovativeness is the result of interplay between all the four subsystems. Hence, there is a need to look at the contribution of each subsystem for making the system (organization) innovative. The organization’s interaction with the external environment in which it operates, has also to be taken into account while assessing the innovativeness of the firm. Earlier studies in this area (e.g., Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Miller, 1983) have well recognized the importance of organization’s environment in influencing innovativeness. Siguaw, Simpson and Enz (2006) report that environmental influence is important as any uncertainty in it may moderate the linkage between innovation orientation and form, rate, and type of innovation. Under conditions of high competitive intensity, technological change, regulatory uncertainty, and market turbulence, there is a greater likelihood that the synchronization between the firm’s innovation orientation and the form, type, number, and speed of innovations may be affected. Thus, the effectiveness of a firm’s orientation is conditioned by the nature of its market (Gatignon and Xuereb, 1997).

**Critical Factors of Organizational Innovativeness**

A review of variables that assess the presence of organizational innovativeness was conducted.

**Sensitivity**

Aguilar (1967) states that sensitivity to the environment is an important factor that leads to innovative ideas. Organizational studies identify scanning (a search for opportunities or information) as one of the ways by which an organization can remain alert (Miller and Friesen, 1980). Additionally, organizations should search; anticipate problems, and formulate strategic responses to adapt to environmental changes (Singh, House and Trucker, 1986).

**Learning**

Learning involves the development of the capacity to assimilate existing knowledge (Cohen and Levinthal, 1990). While Shrivastava (1983) provides a typology of learning from a behavioural view, Malerba (1992) provides taxonomy of organizational learning from an economic perspective. Malerba’s taxonomy constitutes learning by doing, learning by using, learning from advances in science and technology, learning from industry spillovers, learning by interacting, and learning by searching.

Learning takes place when organizations interact with their environment and increase their understanding of reality by observing the results of their acts (Hedberg, 1981). Adaptability is both facilitated by and leads to learning. According to Mirvis and Berg (1977), an organization is a learning system where the constituents both acquire knowledge and information, and experiment with new forms of behaviour and structure. Thus an innovative organization is one that adapts through continuous learning and improves its learning capabilities consistently to respond to the environment by unlearning the old routines and by inventing or adopting new alternatives. Cangelosi and Dill (1965) propose a model, which viewed organizational learning as a series of interactions between adaptation at the individual or sub-group level and adaptation at the organizational level. Shepard (1967) says “an innovation producing organization is one which is consistently learning, adapting to changes within itself and its environment,...”
Newness

Innovations are produced when original solutions to identified needs and problems emerge. Pelz (1983), states, "when an organization develops its own first-line solution to a problem without benefit of prior examples, it is said to 'originate' its innovation. According to Barron (1963), the first criterion of an original response is that it should have a degree of uncommonness. Thus originality is the capacity to produce adaptive responses, which are apt but unusual.

Trialability

According to Rogers and Shoemaker (1971), trialability is the degree to which an innovation may be experimented with, on a limited basis. Essentially, trialability (the extent to which an idea may be tested in the organization) helps the organization to identify potentially successful innovations, and serves as a filter against wild, fantastic ideas.

Communicability

Researchers who studied the innovation-communication relationship have emphasized the potential need for extra-organizational, intra-organizational, and intra-laboratory communication, for the promotion of innovations. Based on earlier studies, Tushman (1977) argues that communication should be viewed as the ability of the innovating unit and one of the critical aspects of the innovation process. Utterback (1971) has found that while sources outside the laboratory were most useful in generating new ideas, sources inside the laboratory were most helpful in problem-solving and implementation assistance all this being facilitated through communication. Gobeli and Rudelius (1987) emphasize the need for an enhanced communication between the marketing and R&D departments to improve results at each stage of the innovation process. Acceptance of an innovation usually depends upon the effectiveness of communication through which the innovation is conveyed.

Risk-Readiness

Earlier studies have indicated the kinds of risks and uncertainties involved in producing innovations and the settings they occur in. "Innovation involves great risk because of the potential cost of failure. But not innovating is seen as more dangerous" (Gobeli and Rudelius, 1987). Thus, organization and its members should have the willingness to attempt what is risky not only because of compulsions of survival but also for pursuit of excellence.

Absorption

According to Kanter (1983), innovative accomplishments stretch beyond the established definition of a job to bring new learning or capacity to the organization. They involve change, a disruption of existing activities and a redirection of organizational energies that may result in new strategies, product, market opportunities, work methods, technical processes, or structures. These departures constitute disruptions and the ability to cope with them becomes inextricably linked to innovativeness, the starting point of all potentially disruptive changes.

Summing up the literature review, it appears that variables related to knowledge management initiatives point to the need to measure certain practices. These are practices of culture, structure, and technology that support knowledge management practices, the presence of which implied that the organization undertook knowledge management initiatives. In the case of innovation, some critical factors that constitute organizational innovativeness were identified. These were adaptability, problem-solving skills, experimentation, and risk-readiness, learning, communication, and absorptive capacity. Thus if an organization is engaged in such activities, it can be considered as one which is organizationally innovative.

METHODOLOGY

This exploratory study addressed the measurement of the relationship between knowledge management initiatives and organizational innovativeness in organizations by formulating a conceptual model and validating it with a sample set of firms in the IT industry.

Conceptual Model

We formulated the conceptual model after an exhaustive review of literature and discussion with the experts. Knowledge management initiatives were found to be influenced by the subsystems of culture, technology, and structure. From the review of literature, the variables that come under each of the subsystems of culture, technology, and structure were identified. Organizational innovativeness in turn is reflected by qualities of sensitivity, learning, newness, trialability, communicability, risk-readiness, and absorption found in an organization.
A conceptual framework was developed to explain the relationship between knowledge management initiatives and organizational innovativeness. The model as seen in Figure 1 illustrates how knowledge management initiatives have a potential to influence organizational innovativeness. This model shows knowledge management initiatives to be an input and organizational innovativeness to be the output.

**Questionnaire Development**

Based on the proposed conceptual framework, questionnaires were developed to measure knowledge management initiatives and organizational innovativeness separately. Items were developed to measure each of the variables. Items were measured on a five-point Likert type rating scale ranging from strongly agree to strongly disagree in which weights were assigned from 5 to 1 (Strongly Agree [5], Agree [4], Neutral [3], Disagree [2] and Strongly Disagree [1]). For reverse items, the weights were reversed.

The knowledge management initiatives questionnaire initially had a total of 60 items. It was designed to measure the effect of three subsystems of culture, structure, and technology on organizational innovativeness. The subsystem of culture includes four variables:

a) **Leadership support**, which measures the extent of commitment and support of senior managers for knowledge management initiatives in terms of making clear-cut policies, allocating needed resources, and continuously monitoring and evaluating the outcome of such initiatives.

b) **Learning climate** aims to capture the use of policies in the organization that emphasizes occurrence of learning aimed at enhancing the individual employee’s absorptive capacity.

c) **Networking** measures the facilitation of interaction of employees either formally or informally both within the organization and between the organizations so that collaboration takes place and thereby knowledge sharing is ensured.

d) **Reward/Recognition** measures the practice of recognizing and rewarding the individual employees or groups for sharing their knowledge with colleagues and for using the existing knowledge contributed by others.

The items designed to measure the effect of structure subsystem includes items that measure the extent of use in the organization of non-hierarchical teams and cross-functional teams. The other items included were designed to measure the extent of leveraging unique individual

---

**Figure 1: Conceptual Model for Enhancing Organizational Innovativeness through Knowledge Management Initiatives**

- **Learning**
  - Network
  - Leader
  - Reward

- **Technology**
  - Culture
  - Structure

- **Knowledge Management Initiative**
  - Trialability
    - Newness
    - Communicability
  - Learning
    - Readiness
    - Absorption
  - Innovativeness
skills, encouragement of individuals to have extensive contact to gather new knowledge or information and awarding of team-based incentives. The items that aimed to determine the extent of the use of technology included understanding advantages of IT, access to repositories, use of effective communication and collaboration, construction and use of directory of expertise, informal networks, best practice reports, and KM portal.

Items that measure the variables of organizational innovativeness were taken from a pre-existing questionnaire and adapted from a doctoral thesis titled, “A Study of Organizational innovativeness: Analysis of Some Correlates and Causal Factors” (Ravichandran, 1993). The original questionnaire contained 65 items for measuring variables such as sensitivity that measured the degree of alertness displayed by the organization in receiving even the subtlest changes in the environment; learning that measured the degree of consistent efforts of the organization to improve its learning capabilities to respond to the environment by unlearning old routines and by inventing or adopting new alternatives; newness that determined the extent of originality and novelty of the ideas generated or solutions arrived at for solving the organizational problems; trialability which measured the extent to which a new idea may be tested in the organization; communicability that determined the extent to which the ideas/solutions generated either from within or from outside were made available to all the relevant people; risk-readiness determined the amount of investment of organizational resources and manpower in new initiatives, under the conditions of uncertainty about returns; and absorption, which was a measure of organization’s ability to cope with the changes introduced by new products/processes.

These two questionnaires were validated with experts. After determination of face validity, the number of items in the knowledge management initiatives questionnaire was brought down to 45 and the number of items in organizational innovativeness questionnaire was reduced to 34.

Sample

Our study was carried out on a sample of 84 people drawn from the IT industry. The sample was drawn from twenty Bangalore-based organizations that had implemented knowledge management initiatives and had SEI CMM level 5. Thirteen of them were Indian organizations and seven were multinational organizations. The number of employees in these organizations varied from 300 to 40,000; 95 per cent of these twenty organizations had undertaken knowledge management initiatives within the last ten years. In about 70 per cent of the organizations, knowledge management initiatives were the responsibility of a knowledge management unit, especially constituted for this purpose. These organizations had not availed of the services of consulting companies either for embarking upon or for monitoring and evaluating knowledge management initiatives in their organization. In about 61 per cent of these organizations, knowledge management is mostly technology-driven and hence knowledge management activities were initiatives only in the technological subsystem.

Data Collection Procedure

Data was collected using both e-mail and personal administration. In the e-mail-based data collection method, the questionnaire was posted on the corporate KM portals along with an introduction about the study. The questionnaire was downloaded by the respondents, filled and sent to the researcher by e-mail. The questionnaire was also personally administered either individually or in small groups.

Sample Characteristics

The random sample of respondents (n=84) consisted of individuals from both technical as well as managerial positions, and both at senior and junior levels. Eighty-six per cent of the sample consisted of male respondents. The average age is about 30 years, with the range of 23-50 years. About 50 per cent of these respondents were engineers (possessing either B.E. or B.Tech degree). Out of these, 84 respondents (79%) held technical positions, being engaged in developing software, coding, testing, and network management. Their tenure in the present organization ranged between 12-120 months, with the mean experience being 30 months. Almost 93 per cent of the respondents reported that knowledge management was either highly useful or useful to an extent.

Data Analysis

Mean and standard deviations were computed for variables of knowledge management initiative and organizational innovativeness. Correlation analysis for the variables of knowledge management initiative and organizational innovativeness was done using Pearson correlation coefficient. Factor analysis of the knowledge
management initiative items and the organizational innovativeness items was done separately to assess the factors underlying the knowledge management initiative variables and organizational innovativeness variables separately. Varimax rotation was used, and eigen values greater than 1 were retained for interpretation. This was followed by calculation of Cronbach alpha, to determine the reliability of the two questionnaires. A simple multiple regression analysis was done to identify the influence of knowledge management initiatives on organizational innovativeness. An organizational innovativeness score was computed and used as the dependent variable. The variables of knowledge management initiative were used as the independent variables. The $R^2$ and $F$ statistics are reported.

**RESULTS AND DISCUSSION**

As knowledge is considered a value creating resource, organizations, particularly the knowledge intensive ones (Indian IT organizations), are taking various initiatives in order to exploit their knowledge assets. These initiatives seem to encompass three subsystems, viz., culture, structure, and technology. To understand the relationship these subsystems have on the overall construct of knowledge management initiatives, the correlations between the variables constituting the knowledge management initiatives were computed using Pearson’s product moment correlation. Table 1 shows the results.

In examining the correlations, it is found that variables of knowledge management initiatives are significantly correlated with each other ($p=0.01$). These results are in line with the conceptual papers written earlier by Huysman, Fischer and Heng (1994); Gallagher and Hazlett (2000); and Armistead and Meakins (2002). Technology is one of the major strengths of the organization. Likewise, culture determines the way the organization functions. Structure is also said to be associated with knowledge management initiatives. Flexible non-hierarchic (Teece, 2000) self-organizing teams (Nonaka and Takeuchi, 1995; Leonard-Barton, 1992) are recommended for knowledge management initiatives. Despite the fact that all variables are significantly correlated, they have differences in correlation values. Structure and technology have an $r$ value of 0.48 ($p=0.01$). Technology and learning climate have $r$ value of 0.64 ($p=0.01$). However the $r$ value between leadership support and learning climate is higher at 0.68 ($p=0.01$), indicating that leadership support and learning climate have a strong association with each other.

The correlation between the variables of knowledge management initiatives implies that the three important subsystems — technology, culture, and structure — are influenced by each other and in combination influence any organization. The nature of the underlying latent construct of knowledge management initiatives was assessed using factor analysis.

Considering that significant correlations existed, a change in variable structure was expected. The rotation resulted in a single significant factor, thus indicating the one-dimensional nature of the construct of knowledge management initiatives. Table 2 shows the results. The Cronbach

### Table 1: Means, Standard Deviations and Correlations of the Knowledge Management Initiatives

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Structure</td>
<td>3.56</td>
<td>1.04</td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Technology</td>
<td>4.12</td>
<td>0.60</td>
<td>0.48**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Leadership support</td>
<td>3.94</td>
<td>0.89</td>
<td>0.53**</td>
<td>0.61**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Learning climate</td>
<td>3.99</td>
<td>0.72</td>
<td>0.46**</td>
<td>0.64**</td>
<td>0.68**</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Networking</td>
<td>3.79</td>
<td>0.70</td>
<td>0.40**</td>
<td>0.56**</td>
<td>0.59**</td>
<td>0.63**</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>6. Reward/Recognition</td>
<td>3.45</td>
<td>0.91</td>
<td>0.46**</td>
<td>0.58**</td>
<td>0.73**</td>
<td>0.67**</td>
<td>0.63**</td>
<td>1.00</td>
</tr>
</tbody>
</table>

n=84  
**$p<0.01$**

### Table 2: Factor Analysis for Knowledge Management Initiatives

<table>
<thead>
<tr>
<th></th>
<th>Factor 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership support</td>
<td>0.864</td>
</tr>
<tr>
<td>Learning climate</td>
<td>0.852</td>
</tr>
<tr>
<td>Networking</td>
<td>0.788</td>
</tr>
<tr>
<td>Reward/Recognition</td>
<td>0.851</td>
</tr>
<tr>
<td>Structure</td>
<td>0.669</td>
</tr>
<tr>
<td>Technology</td>
<td>0.801</td>
</tr>
<tr>
<td>Cumulative % of variance explained</td>
<td>65.080</td>
</tr>
<tr>
<td>Factor eigen values</td>
<td>3.905</td>
</tr>
</tbody>
</table>
Table 3: Means, Standard Deviations, and Correlations of Organizational Innovativeness

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sensitivity</td>
<td>3.171</td>
<td>0.492</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Learning</td>
<td>3.824</td>
<td>0.759</td>
<td>0.493**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Newness</td>
<td>3.441</td>
<td>0.541</td>
<td>0.504**</td>
<td>0.677**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Trialability</td>
<td>3.248</td>
<td>0.413</td>
<td>0.368**</td>
<td>0.389**</td>
<td>0.317**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Communicability</td>
<td>3.564</td>
<td>0.578</td>
<td>0.293**</td>
<td>0.633**</td>
<td>0.508**</td>
<td>0.254*</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Risk readiness</td>
<td>2.855</td>
<td>0.414</td>
<td>-0.009</td>
<td>-0.334**</td>
<td>-0.346**</td>
<td>-0.112</td>
<td>-0.165</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7. Absorption</td>
<td>3.264</td>
<td>0.487</td>
<td>0.368**</td>
<td>0.318**</td>
<td>0.363**</td>
<td>0.184</td>
<td>0.275*</td>
<td>0.047</td>
<td>1</td>
</tr>
</tbody>
</table>

n=84
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Alpha of the knowledge management initiatives questionnaire was 0.88, implying that the questionnaire is reliable.

Based on the literature survey, it was found that the variables namely sensitivity, learning, newness, trialability, communicability, risk-readiness, and absorption determine an organization’s ability to pursue innovation. However, their relative importance to the construct “organizational innovativeness” had to be established. To assess this, correlations between the variables were computed, followed by factor analysis.

The above table shows that sensitivity is significantly associated with learning, newness, trialability, communicability, and absorption. Learning has a significant positive association with newness, trialability, communicability, and absorption and a significant negative relationship with risk readiness. The variable newness is significantly associated with trialability, communicability, and absorption. The variable trialability is found to be significantly correlated only with communicability. The variable of communicability is significantly related to absorption. Risk-readiness has a significant negative correlation with learning and newness, but no significant association with other variables. The reason could be that to take risks under conditions of uncertainty may not have been thought of as a contributory factor for innovativeness. This is particularly so under economic recession, when most of the IT companies engaged in outsourcing struggle hard to survive.

The results of the factor analysis of the organizational innovativeness questionnaire shows that it is a two-dimensional factor. Factor 1 includes variables of sensitivity, learning, newness, trialability, communicability, and absorption. The common theme in all these variables is the ability of the organization to be innovative. Hence this factor can be named as core innovative ability. The other factor includes the single variable of risk-readiness. The Cronbach alpha (0.72) reveals that the questionnaire is reliable.

Table 4: Factor Analysis of Organizational Innovativeness

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>0.783</td>
<td>0.037</td>
</tr>
<tr>
<td>Learning</td>
<td>0.656</td>
<td>0.592</td>
</tr>
<tr>
<td>Newness</td>
<td>0.642</td>
<td>0.552</td>
</tr>
<tr>
<td>Trialability</td>
<td>0.530</td>
<td>0.188</td>
</tr>
<tr>
<td>Communicability</td>
<td>0.553</td>
<td>0.460</td>
</tr>
<tr>
<td>Risk readiness</td>
<td>0.136</td>
<td>-0.877</td>
</tr>
<tr>
<td>Absorption</td>
<td>0.718</td>
<td>-0.165</td>
</tr>
<tr>
<td>Cumulative % of variance explained</td>
<td>36.796</td>
<td>61.089</td>
</tr>
<tr>
<td>Factor eigen values</td>
<td>2.576</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Table 5: Regression Analysis for Organizational Innovativeness

<table>
<thead>
<tr>
<th>Model</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>10.356</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Structure</td>
<td>0.100</td>
<td>1.020</td>
</tr>
<tr>
<td></td>
<td>Technology</td>
<td>0.129</td>
<td>1.123</td>
</tr>
<tr>
<td></td>
<td>Leadership support</td>
<td>0.077</td>
<td>0.574</td>
</tr>
<tr>
<td></td>
<td>Learning climate</td>
<td>0.393</td>
<td>3.068</td>
</tr>
<tr>
<td></td>
<td>Networking</td>
<td>0.059</td>
<td>.525</td>
</tr>
<tr>
<td></td>
<td>Reward/Recognition</td>
<td>0.084</td>
<td>0.641</td>
</tr>
</tbody>
</table>

Regression R Square | F | Significance
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.55</td>
<td>15.83</td>
<td>0.000</td>
</tr>
</tbody>
</table>
The regression results reveal interesting findings. The beta weights given in Table 5 indicate that there is a positive linear relationship between learning climate and innovativeness. Amongst the knowledge management initiative variables, learning is found to be significantly influencing the innovativeness ability of organizations. Other knowledge management initiative variables such as leadership, networking, reward, structure, and technology have not been found to be significant in influencing organizational innovativeness. The reason is that learning directly associates with acquiring new knowledge and skills. This acquired knowledge and skills play a major role in enhancing the organization’s ability for innovation. For example, knowledge level may grow exponentially if management is able to stimulate the conditions to learn more and to increase experience.

Organizations may use the individual’s learning activities and learn through them. This creates an organizational learning system, which provides the possibility of enhancing the capacity to generate new offering proposals (Coopey, 1995; Sinkula, 1994; Senge, 1990). Perez-Bustamante (1999) reports that innovation process is a locus of learning with outcomes varying according to the phase in which the learning activity is undertaken. Therefore, in the first part of his innovation model, the invention locus, learning processes imply the acquisition of knowledge associated with the natural laws.

The results of the present study strongly support the findings of the earlier studies that organizations have to focus on learning to enhance their innovativeness. It implies that organizations need to provide a climate that is conducive for learning, particularly, offering the best possible training facilities to its employees and thereby increasing their absorptive capacity. In addition, they should initiate measures that are aimed at reviewing the past project/product development success and failure so that new lessons can be learnt and also mistakes can be avoided.

The initiative for managing learning climate is frequently identified as an important antecedent of innovation. It implies that innovativeness can be achieved when the organization focuses on knowledge management initiatives in general, and its learning climate in particular. This finding is in line with the earlier studies in this area. For example, Perez-Bustamante (1999) reports that innovation processes are formed by knowledge bases and continuous flows of information. This view is echoed by Forcadell and Guadamillas (2002), who report that innovation is a goal and knowledge management is a method. Further, Coombs and Hull (1998) argue that there is a clear relationship between knowledge management practices and innovation. Storey and Kelly (2002) report that knowledge management initiatives such as learning culture, entrepreneurial climate, organizational creativity, shared vision, collaborative working, communication, empowerment, shared knowledge, knowledge systems, and decision systems strongly influence the innovativeness of a service firm that in turn results in new services and new product developments.

However, the variables such as leadership support, networking, reward/recognition (culture), structure, and technology are not found to significantly influence organizational innovativeness. The possible reason is, unlike learning (culture) which directly results in acquiring new knowledge and skills to do certain things (innovation), these variables were more useful in facilitating the process of learning than resulting directly in innovation. For example, networking would lead to increased interaction among the members of the organization. This would result in learning from each other. Again, reward and recognition are meant to encourage individuals to share their knowledge with others. This also results in learning. Furthermore, organizational structure, such as cross-functional teams, would result not only in a close relationship but also learning from other team members. That is the case for technology too. It enables the individuals to identify, locate, and use the information/knowledge thereby resulting in learning. Therefore, it is clear that it is the learning ability which significantly influences organizational innovativeness. All other variables of knowledge management initiatives can support the learning process thereby enhancing the innovativeness of the organization.

This study provides scope for further research in the area of innovation measurement especially in the case of innovation typologies, such as incremental and radical innovation. Correlations between knowledge management initiatives and organizational innovativeness are now established. However, the relationship across knowledge management initiatives, organizational innovativeness, and innovation typologies is yet to be established. Although, the present study made an attempt to understand this phenomenon in the context of IT firms, “innovation”...
in IT firms (particularly in software services) is ambiguous, more porous, and still remains to be well defined. Research in future could have a control sample of companies, which have not adopted knowledge management initiatives. This will enable us to understand the antecedents of knowledge management initiatives with organizational innovativeness as the consequence. Further, organizations can be considered as sample units rather than individuals. Finally, research can cover other knowledge-intensive organizations such as biotechnology and pharmaceutical firms for comparison.

REFERENCES


Mary Mathew is an Associate Professor at the Department of Management Studies, Indian Institute of Science (IISc), Bangalore. Her research interest is in the area of organization designs that maximize innovative patents. She looks at systemic changes namely process, design, and culture needed to make products in the ICT sector. Her recent publications are in the International Journal of Information Technology and Management, Journal of Innovation Management, Journal of Intellectual Property Rights, Vikalpa, Decision, CURIE Journal, Team Performance Management, Journal of High Technology Management Research, and The South East Asian Journal of Management. At IISc, she is also a Resource Executive of the Society of Innovation Development, the university industry office of IISc where she negotiates with companies for IISc’s intellectual property.

e-mail: mmathew@mgmt.iisc.ernet.in

Devaraj Kumar is with Human Resource function of McAfee. He did his MSc Engineering from the Indian Institute of Science, Bangalore. He also has a Masters in Social Work.

e-mail: Kumar_Devaraj@mcafee.com

Santhi Perumal is a doctoral student at the Department of Management Studies, Indian Institute of Science, Bangalore. She has a post-graduate degree in Applied Psychology. Her current research interests are in the areas of academic patenting, inventor behaviour, organizational innovativeness, and science and innovation linkages. Her other areas of interest include positive organizational behaviour, psychological contracts, and resilience.

e-mail: santhi@mgmt.iisc.ernet.in

Years ago, technical writers documented machinery and equipment; today they’re more likely to work on information for software, websites, intranet pages, and procedures and polices in business areas like knowledge management,

— Steve Moss quotes