Knowledge Management Technology, Knowledge Sharing and Learning - A Case Study

Lewlyn L R Rodrigues
Professor, Department of Humanities & Management
Manipal Institute of Technology, Manipal Academy of Higher Education
Manipal, India
rodrigusr@gmail.com

Asish Oommen Mathew
Assistant Professor, Department of Humanities & Management,
Manipal Institute of Technology, Manipal Academy of Higher Education
Manipal, India
asishmathew@gmail.com

***Abstract*—Modern day organizations focus on managing their intellectual capital as they have realized its potential in improving competitive advantage. Information technology (IT) companies, in particular, have implemented knowledge management systems in a bid to enhance productivity and foster innovation. This research work analyses the influence of knowledge management technology on the sharing of knowledge and learning. The study is carried out in the context of large Indian IT companies. A questionnaire survey was conducted among the top six Indian IT companies and data is analyzed using Partial Least Square - Structural Equation Modeling method. The results indicate that knowledge management technology positively impacts sharing and indirectly influences learning.**

Keywords—Knowledge Management Technology, Structural Equation Modeling, Information Technology, Software, Multivariate analysis

I. INTRODUCTION

Knowledge Management (KM) is about managing the knowledge assets in an organization in an effective manner. Having an active KM implementation has been proved to be beneficial to organizations regarding improving performance, faster decision making and learning [1]. Owing to its importance, KM has now developed as a major discipline in the functional structure of modern-day organizations. In this era of knowledge economy, KM has become crucial for organizational adaptation and survival as it enables them to learn from experience [2]. The success of modern-day organizations depends on how much knowledge they create and how fast they can commercialize it [3].

Owing to the in-house technical capabilities and the very nature of their dynamic business environment, the information technology (IT) sector adopted KM practices much earlier compared to other industries. This move enabled IT organizations to become global leaders due to their innovative and agile software development practices. KM helps software organizations to improve software construction and software maintenance [4].

For the successful implementation of any management function, there are a set of critical success factors (CSFs). Likewise, researchers have proposed several CSFs crucial for KM success. Knowledge Management Technology (KMT) can be considered as the backbone of any KM initiative, and hence a significant CSF. Various KM tools support the KM initiatives in an organization. This ultimately results in the creation of knowledge and organizational learning. Having appropriate KMT is crucial for long-term survival of the KM initiative and supports knowledge creation and the innovation process. This research explores the relationship between KMT, sharing of knowledge and learning.

II. LITERATURE REVIEW

The importance of technology dimension in the success of KM has been analyzed by various researchers [5,6]. Knowledge management technology usually refers to the hardware and software infrastructure required to support the various KM processes such as knowledge sharing, creation, application and storage [7]. If KMT can be given the right inputs, it can deliver timely and relevant knowledge [8]. It can also improve the collaboration of individual, group, organizational, and inter-organizational knowledge [9,10].

Some of the commonly used tools to support KM are document management systems, data warehouse, enterprise information portals, groupware, workflow systems, training systems, etc. [11]. Recent technologies which can be added to this list are mobile learning or m-learning [12], social networking-based systems [13], virtual teaming, tagging and skill-management [14].

Ultimately, any KM technology which is used in an organization should result in knowledge sharing, knowledge creation and thereby organizational learning. The objective of this is to empirically analyze the influence of KMT on knowledge sharing and learning.

III. HYPOTHESES DEVELOPMENT

KMT consists of high-quality hardware and software infrastructure to support the various KM processes. It forms information networks in an organization enabling knowledge sharing [15]. There are search and retrieval functionalities provided in knowledge portals to acquire the right knowledge and support individual learning [16]. Knowledge repositories present as part of the KM system consists of knowledge on a vast array of topics shared by the experienced employees [17]. KMT provides quality and timely knowledge to employees which improve the learning effectiveness of individuals. Sharing of knowledge by employees can result in employees' engaging in learning activities [18]. When knowledge is available at their disposal through the support of technology, employees will be willing to use them for their knowledge work which leads to individual learning [19, 20]. Based on these literature reviews, the following three hypotheses are proposed for this research:

$H_{1:}$ *There is a significant positive relationship between knowledge management technology and the sharing of knowledge*

H_2: *There is a significant positive relationship between knowledge management technology and learning.*

H_3: *There is a significant positive relationship between the sharing of knowledge and learning.*

IV. Research Methodology

A. Samples

For this study, six companies were randomly selected, from the top ten IT companies in India based on employee size. The samples for this study were the knowledge workers which included Project Managers, Team Leads and Software Engineers who have completed at least one year of service in the respective organization. A self-administered questionnaire was used to collect the data by creating a web link using an online survey tool.

A pilot study was conducted by collecting 25 responses to check the validity and reliability of the survey instrument. After the process of validation, primary data was collected by e-mailing the survey link to the potential participants. Data was collected throughout four months, after which 185 samples were obtained. However, 43 responses had to be discarded due to incomplete and inaccurate data. So, the final data set used for analysis consisted of 142 complete responses.

B. Research Instrument

A questionnaire was developed based on literature review and expert opinion for measuring the constructs of the study. Experts from industry and academia performed content validity of the questionnaire. A pilot study was conducted to validate the questionnaire for its adequacy and reliability further. The data for each item of the questionnaire was captured on a 7-point Likert scale ranging from "Strongly Agree" (7) to "Strongly Disagree" (1).

C. Content Validity

Content validity of the research instrument was conducted to assess the adequacy of the questions developed. During this process, various experts are made to evaluate the content of the survey instrument [21]. Four experts, two each from academia and industry performed the content validity. Suggestions were provided regarding concept, phrasing, and formulation of statements, which were incorporated. Finally, the instrument developed consisted of 13 Likert scale questions which consisted of items measuring knowledge management technology (6 questions), sharing of knowledge (5 questions) and learning (2 questions).

V. Results and Discussion

A. Demographic Analysis

The first section of the survey instrument consisted of items to capture the demographic information of the samples collected. The respondents' average age was found to be 3.2 years in the current organization. However, their total experience mean was around 4.7 years. The company-wise response rates are depicted in Fig.1. The role wise response rate of the respondents is depicted in Fig.2. The highest response was from software engineers (60%) followed by team leads (35%) and Project Managers (4%).

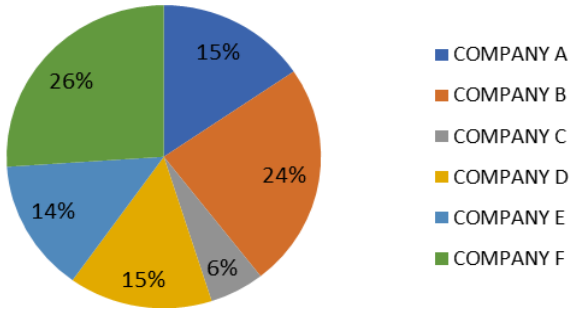

Fig. 1. Proportion of respondents from each company

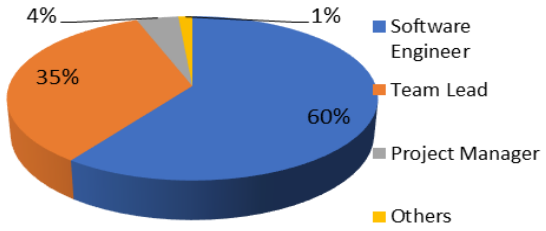

Fig. 2. Proportion of respondents' designation wise

B. Statistical Analysis

The method used for data analysis was partial least square-structural equation modeling (PLS-SEM) approach and tool used was SmartPLS V2.0. PLS-SEM approach does not rely on the normality of data and can be used in situations where sample size is less and predictive accuracy is paramount [22]. The PLS-SEM analysis can be broadly classified into two stages – the measurement model analysis and the structural model analysis. The measurement model analysis is conducted to evaluate the validity and reliability of the measurement items. The second stage of structural model analysis is conducted for testing the hypotheses [23].

C. Testing of the Measurement Model

Convergent and discriminant validity can be determined using measurement model analysis. Convergent validity can be defined as "the degree to which two or more items measuring the same variable agree" [24]. For convergent validity criteria to be satisfied average variance extracted (AVE) values should be higher than 0.50. For determining reliability, the composite reliability (CR) measure should be higher than 0.80 [25]. The results obtained (Table I) proved that all the values of AVE, CR and the factor loadings were above the prescribed requirements [25, 26]. Therefore, the model was found to have adequate convergent validity. Also, the CR values were found to be higher than 0.80 thus justifying the reliability of the model.

Discriminant validity is the "degree to which items differentiate between variables" [26]. Fornell-Larcker criterion was used to assess discriminant validity. According to this criterion, the square root of AVEs for a construct should be higher than its correlation with other latent variables. This criterion was found to be satisfied (Table II) and therefore it was concluded that the model constructs exhibited discriminant validity.

D. Structural Model

Once the measurement model was confirmed for its validity and reliability, the structural model was subjected to

further analysis. The R-square values for the latent variable SHR were 0.25 and for KMT was 0.483. Hence it was inferred that KMT caused 25% of the variance in SHR and 48.3% of the variance in LRN was caused by KMT and SHR together (Fig.3).

The hypothesis testing results are depicted in Table III. Out of the three hypotheses postulated, two were accepted (H1, H3) and one was rejected (H2). The relationship between KMT and SHR was found to be significant at 0.1% level with a beta coefficient of 0.499. Similarly, the relationship between SHR and LRN was supported at 0.1% level with a beta coefficient of 0.723. However, the relationship between KMT and LRN was not supported at 5% level of significance.

E. Discussions

The results of the study show that KMT has a strong positive correlation on SHR; however, it has failed to prove that KMT has a direct influence on LRN. The finding of this research is in line with the past research findings discussed in the literature review. This underscores the fact that providing adequate technology support for KM will support the KM process of knowledge sharing. However, the technology does not seem to affect the learning directly. It can be concluded that although technology results in knowledge sharing, the technology support alone is not enough for the learning to happen in the organization.

Additionally, it was also proved that SHR influences LRN and this was in line with the previous research findings. Knowledge sharing practices are enabling learning behavior in individuals. However, it can be observed that even though KMT is not directly impacting Learning behavior, it has got a strong influenced on sharing, and sharing has a strong influence on learning. This way KMT has an indirect effect on learning.

TABLE I. EVALUATION OF MEASUREMENT MODEL – VALIDITY TESTS

Constructs	*Items*	*Outer Loadings*	*Composite Reliability*	*Average Variance Extracted*
Knowledge Sharing	SHR1	0.684	0.830	0.551
	SHR2	0.770		
	SHR3	0.822		
	SHR4	0.684		
Learning	LRN1	0.885	0.868	0.767
	LRN2	0.867		
Knowledge Management Technology	KMT2	0.781	0.859	0.604
	KMT4	0.830		
	KMT5	0.810		
	KMT6	0.680		

Note: KMT1, KMT3, and SHR5 deleted due to low outer loading

TABLE II. ASSESSMENT OF DISCRIMINANT VALIDITY (FORNELL – LARCKER CRITERION)

	Knowledge Management Technology	*Learning*	*Knowledge Sharing*
Knowledge Management Technology	**0.777**		
Learning	0.300	**0.876**	
Knowledge Sharing	0.499	0.693	**0.742**

Notes: Diagonal values are square root of AVE (indicated in bold)

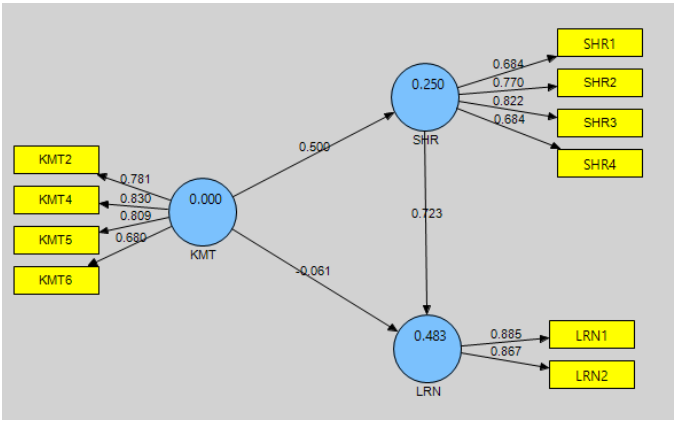

Fig. 3. Measurement Model SmartPLS Output

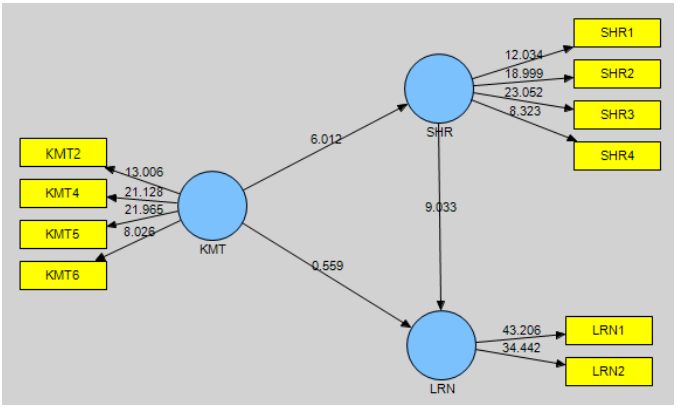

Fig. 4. Structural model SmartPLS output

TABLE III. HYPOTHESIS TESTING RESULTS

Hypothesized Relationships	*β value*	*t-statistics*	*Result*
Knowledge Management Technology → Knowledge Sharing	0.499	6.013*	*Supported*
Knowledge Management Technology → Learning	-0.061	0.559	*Not Supported*
Knowledge Sharing → Learning	0.723	9.033*	*Supported*

Note: *Significant (p-value less than 0.001)

VI. CONCLUSION AND FUTURE SCOPE

This research clearly highlights the importance of KMT in augmenting the KM initiative of IT companies. Technology indeed is a CSF of KM as it supports knowledge sharing which is key to the success of any KM initiative. Therefore, top management should have a proper KM technology strategy in place to support KM in their organization. This strategy should outline the technologies to be acquired to support the various KM processes. Giving training to employees on the acquired technology is also crucial for realizing the true potential of the acquired technology.

Although KMT does not directly influence learning, the indirect influence it possesses cannot be overlooked. There should be a constant learning process happening in any organization for it to be innovative. Technology supplements this process by supporting the various KM processes such as knowledge sharing.

This research is not free from its limitations which needs to be highlighted for future research endeavors. The results of this study are purely based on self-reported survey data.

To avoid response bias, future researchers should supplement this data with qualitative research inputs through observations and interviews. The influence of KMT is studied only concerning knowledge sharing and learning in this research. However, there are other KM processes which may be influenced by KMT such as creation, reuse, etc. Future researches could extend this model by adding more research constructs of relevance and empirically test the holistic model.

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