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The Influence of Knowledge Management Practices and Systems on Firm Performance

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Abstract
The objective of this paper is to study the influence of efficient knowledge management practices on firm performance. The proposed model is tested using structural equation modeling (SEM). A sample of 310 senior and middle-level managers from Indian IT companies was chosen using simple random sampling, and the feedback data were analyzed with the structural equation model. The results showed that knowledge identification, knowledge acquisition, knowledge storage, knowledge dissemination and knowledge application have significant factor loadings on efficient knowledge management; and financial performance, firm productivity, employee performance, innovativeness and customer satisfaction have significant factor loadings on organizational performance. The results indicate that knowledge management practices leads to efficient knowledge management in a firm and directly influences the organization's performance.

Key words: Knowledge management, Knowledge management systems, KM, KMS, Firm performance, Information Technology.

Introduction

Technology is changing at a rapid pace; organizations must struggle to maintain competitive advantage. Knowledge is slowly becoming the most important factor of production, next to labor, land and capital [1]. The tacit and explicit knowledge residing in an organization is difficult to measure, codify, store or use. The knowledge which is anchored in employees' minds can get lost if they decide to leave the organization. The key objective of knowledge management is to improve the processes of acquisition, integration and usage of knowledge [2]. KM is a process that helps achieve objectives and enhance organizational performance through creating, accumulating, organizing and utilizing knowledge. The key benefit of introducing KM practices in organizations is its positive influence on organizational performance. Organizations which strive to keep their competitive advantage have realized the importance of knowledge management (KM) and the necessity of information and developing knowledge. KM helps to have a proper understanding of and insight into their internal experiences and external resources. KM activities, including knowledge identification, knowledge acquisition, knowledge storage, knowledge dissemination and knowledge application can help the organizations to achieve necessary capabilities. Having an efficient Knowledge management system (KMS) helps in areas such as problem solving, dynamic learning, strategic planning, decision-making, and improving their organizational performance [3]. The main goal of KM is the rapid, effective and innovative utilization of the resources and knowledge assets, infrastructures, processes and technologies in order to promote organizational performance. A firm with a KM capability will use resources more efficiently and so will be more innovative and perform better [4].

Many studies have attempted to explain why certain firms behave better than others by linking different organizational elements with performance measures. These studies include linking performance with strategy, structure, environment, learning capabilities, market orientation, resources, and employees' abilities [5]. Studying the impact of KM practices on organizational performance is required as KM processes can influence the firm's productivity, financial performance, employee performance and customer satisfaction [6]. However, such studies have not been sufficiently considered in literature, and limited studies have been conducted to identify the effect of KM practices on their organizational performance. Organizations can achieve a higher degree of productivity, innovativeness, customer satisfaction and competitive advantage with the use of KM practices [7]. Numerous researchers show that KM affects organizational performance in a positive manner, but this relationship is very difficult to prove [8, 9, 10, 11, 12]. The positive effect of knowledge management practices on firm performance is often implied by researchers. However, studies that empirically prove this link are very rare. The aim of this paper

is to empirically study the influence of efficient knowledge management practices on firm performance. The proposed model is tested using structural equation modeling on a sample of 310 senior and middle-level managers from 100 Indian IT companies having more than 50 employees.

Literature Review and Hypotheses Development

In literature the major knowledge management practices are knowledge identification, knowledge acquisition, storing, disseminating and applying knowledge. These actions help in the organizational learning process and have an impact on the culture and strategies of the organizations [13]. KM as a means to explore the tacit and explicit knowledge of individuals, groups, and organizations and to convert this into organizational asset. Knowledge which is created and stored can be used in various levels of decision making [14]. KM as a systematic and integrated management strategy that develops, transfers, transmits, stores, and implements knowledge so that it can improve efficiency and effectiveness of the organization's manpower [15]. The knowledge-based theory helps significantly towards realizing the important role of knowledge management and states that knowledge management practices play a vital role in achieving high level productivity, financial and human resource performance and finally improving sustainable competitive advantage [16, 17]. For organizations to be more successful and survive in today's competitive market, they need to consider adaptive and intelligent strategies, including KM processes and best practices [18, 19]. Many researchers have developed conceptual models based on this knowledge-based theory which contain critical KM practices.

KM practices are defined in literature in various ways and used in different configurations. The life cycle model which divided a knowledge flow into six phases. They are creation, organization, formalization, distribution, application or implementation, and evolution [20]. Eight Knowledge management practices: reviewing, analyzing processes, analyzing risks, executing plans, developing knowledge, consolidating knowledge, sharing knowledge, and combining knowledge [21]. Different studies have come up with different models to describe KM practices in various ways.

In this research, five main practices: knowledge identification, knowledge acquisition, storage, dissemination and application are adapted from the models of different author [14, 15, 22]. These practices of knowledge management have been frequently applied in evaluation of KM systems in organizations.

***Knowledge identification*:**

Knowledge identification is the process by which organizations understand what knowledge already resides in the organization. If organizations don't know what they already have, they might end up acquiring the same again, leading to redundancy and wastage [23].

***Knowledge Acquisition*:**

This is the process of acquiring and learning appropriate knowledge from various sources both internal and external, such as experiences, experts, relevant documents, plans and so forth. Interviewing, laddering, process mapping, concept mapping, observing, educating and training are the most familiar techniques for knowledge acquisition.

***Knowledge Dissemination*:**

Knowledge dissemination is the process through which personal and organizational knowledge is exchanged. Knowledge dissemination refers to the process by which knowledge is conveyed from one person to another, from persons to groups, or from one organization to other organization [24].

***Knowledge storage*:**

Knowledge storage involves both the soft or hard style recording and retention of both individual and organizational knowledge in a way so as to be easily retrieved. Knowledge storage utilizes technical systems such as modern informational hardware and software and human processes to identify the knowledge in an organization, then to code and index the knowledge for later retrieval [25]. Organizing and organizational knowledge provides the ability to retrieve and use the information by individuals in the organization.

***Knowledge application*:**

This means the application of knowledge and the use of the existing knowledge for decision-making, improving performance and achieving goals. Organizational knowledge should be implemented in the services, processes and products of the organization. Application of knowledge helps organizations in achieving sustainable competitive advantage.

Firm performance is one of the most important constructs discussed in management research and could be considered as the most important criterion for testing the success of firms. Performance is one of the most critical areas of management, which many management scholars and practitioners have focused on improving using strategic variables such as KM practices [5]. Earlier studies have conceptualized firms' performance with measures of return on assets, sales growth, new product success [26], market share and overall performance [27] sales growth, market share and profitability [28], overall performance, new product success, change in relative market share [29], profitability, and customer satisfaction [30].

In this field, financial measures (return on equity, return on investment) and operational measures (market share, sales growth, and, profit growth) were frequently employed to measure organizational performance [30]. There is no full consensus among academic researchers on the variables and indices of organizational performance. Different organizational performance indices have been employed for different types of firms. Researchers have considered different indices for the assessing performance. Author considered return on assets, return on shareholders' salary, and return on investment and dividend as performance indices [31]. Three criteria used to measure organizational performance: organizational effectiveness, share and growth of market and profitability [32].

Author proposed the indices of effectiveness, efficiency, productivity, life quality, innovation, and profitability for measuring firm performance [33]. Some of the most important

indices used in previous research have been adapted for this study. The indices which are taken in this study for measuring firm performance are firm productivity, financial performance, employee performance, innovativeness and customer satisfaction. Customer satisfaction is an important factor for the survival of the firm, and firms which are responsive to changes in customer needs, requirements and wants are expected to achieve a sustainable competitive advantage [34]. Innovativeness can be considered as a crucial factor in achieving high performance. Innovation involves using technology and knowledge to offer customers a new product or service through improved features or lower prices [35]. The chosen five indices are of the highest importance in measuring the performance of firms, and very few studies have been done on the influence of KM activities on organizational performance [36]. Some researchers have been able to identify KM practices and relate them to the firm's performance. Some research indicates that firms which use suitable KM practices might enhance their capabilities, which may in turn result in better firm performance [37, 38, 39]. Performance depends on a firm's ability to combine knowledge into the value creation process and into core strategies employed by the firm. These findings revealed that to achieve and sustain a high level of performance, a firm has to create efficient mechanisms for identifying,, acquiring, transferring and integrating knowledge [39]. Author studied the influence of KM on organizational performance. Results showed that KM positively influences the organizational performance of manufacturing firms [40]. Strategic variables of knowledge (knowledge slack, absorptive capacity, tacitness) play a positive mediating role between transformational leadership and organizational performance [36]. According to the reviewed literature, we propose the following hypothesis:

Hypothesis 1:
Knowledge management practices positively influences the efficiency of knowledge management systems.

Hypothesis 2:
An efficient Knowledge management system positively influences organizational performance.

Methods
A preliminary survey instrument was pre-tested by 30 senior managers and the reliability of the instrument estimated by using Cronbach's Alpha. Cronbach's Alpha values obtained showed that the instruments had acceptable reliability (more than 0.7). The main research was conducted among Indian IT companies with more than 50 employees. All of the questionnaires were distributed during one month. Questionnaires were sent to 800 senior and middle-level managers of 100 IT companies and 310 responses were received in complete shape, giving a response rate of 39%. The knowledge management practices instrument was adapted from [5, 7, 41, 42]. This questionnaire consists of five components: knowledge acquisition, knowledge storage, knowledge identification, knowledge dissemination and knowledge application. A five point Likert scale was used to measure these components (strongly disagree=1, to strongly agree=5).The validity and reliability was confirmed using a confirmatory factor analysis. Results showed that our scale has high validity and reliability. For measuring firm performance, we developed a scale by adapting some items from previous studies, such as [7, 42, 43]. This scale consists of five components: firm productivity, financial performance, employee performance, innovativeness and customer satisfaction. A five point Likert scale was used to measure these components (strongly disagree=1, to strongly agree=5).To examine its validity and reliability we performed confirmatory factor analysis. The results showed that this scale also has high validity and reliability for measuring organizational performance. *Table 1* illustrates the demographic profile of the respondents. The statistic implies that the respondents are experienced and well versed with their KM activities and thus were the appropriate people to participate in the survey.

TABLE.1. Demographic characteristics of the respondents

	Number	**Percentage**
Peripherals (Computer)	20	20
Software	80	80
Total	100	100
Job Classification		
Top IT/MIS Managers	90	29
Lower-Middle IT/MIS Managers	220	71
Total	310	100
Employment in the company		
Less than 3 years	10	3
3-5 Years	110	35
6-10 Years	181	58
More than 10 Years	9	4
Total	310	100
Involvement in KM activities		
Fully Involved	88	28
Partially Involved	222	72
Not involved	0	0
Total	310	100

In this study, structural equation modeling (SEM) technique was applied to confirm that the proposed model is fitting the data well. Items with factor loadings of 0.5 or higher were considered as acceptable variables to measure constructs [44, 45] Reliability analysis was performed using Cronbach's alpha to assess the reliability of the measurement scale. Authors determined that α values exceeding 0.7 are good and that α values between 0.6 and 0.7 are acceptable in social science research [46, 47]. Confirmatory factor analysis with maximum likelihood, using AMOS 20.0 was conducted. Based on the recommendation of [48] the goodness of fit was evaluated using six criteria: chi-square goodness-of-fit, the goodness-of-

fit index (GFI), the adjusted goodness-of-fit index (AGFI), root mean-square error of approximation (RMSEA), Comparative fit index (CFI) and Root mean square residual (RMR). The average variance extracted and the construct reliabilities were also calculated for each construct to check convergent and discriminant validity

Results and Discussion

Figure 1 shows the factor loadings of KM practices (knowledge identification, knowledge acquisition, knowledge storage, and knowledge dissemination and knowledge application), components of Knowledge management and firm performance components (firm productivity, financial performance, employee performance, innovativeness and customer satisfaction). As this figure shows, KM practices significantly and positively influence Knowledge management systems and efficient knowledge management systems significantly and positively influence firm performance.

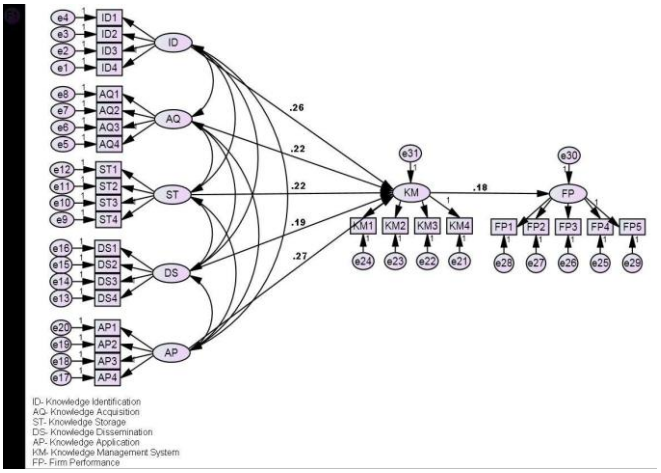

Fig.1. Results of the Structural equation model

The results of confirmatory factor analysis using AMOS 20.0 and model fit indices are provided in *Table 2*. The goodness of fit of the proposed model is commonly evaluated by a few fit indices [49]. It has been suggested that the chi square ($\chi 2$) value, which reflects the inconsistency between model-implied covariance and observed sample covariance should be small and insignificant. CMIN/DF was found to be 1.478. A value below 2 is preferred but values between 2 and 5 are considered acceptable [50]. CFI, GFI and AGFI were found to be respectively 0.974, 0.932 and 0.900, which are all above the acceptable level of 0.9 [50]. RMR and RMSEA were found to be 0.042 and 0.039 respectively which are both below the cut off level of 0.5 [50].

TABLE.2. Estimates of Confirmatory Factor Analysis (CFA)

	$\chi 2$	$\chi 2$/df	GFI	AGFI	CFI	RMR	RMSEA	p
Value	533.67	1.478	0.932	0.900	0.974	0.042	0.039	0.00

In order to establish convergent and discriminant validity the variance extracted (AVE) by the different constructs were examined. The AVE of a construct is a measure that reflects the overall amount of variance in the indicators accounted for by the latent construct. Guidelines suggest that the AVE value should be more than.50 for each construct. The Average Variance extracted (AVE) was found to be greater than 0.5 for all constructs (*Table 3*). To check for discriminant validity the average variance extracted was compared with the corresponding squared inter-construct correlations (SIC). All AVE values were found to be higher than the SIC, thus discriminant validity is established (*Table 5*).

The results of this research suggest that the efficiency of a knowledge management system depends on the knowledge management activities undertaken in a firm. Organizations must properly assess and identify their knowledge requirements. They should know what is lacking and what to search for. If this is not done they might end up acquiring the same information which already exists. This leads to duplication and redundancy and wastage of organizational resources. After the need is ascertained the firm must acquire the needed information in the most efficient manner possible. The acquired knowledge must be stored so that it is easily accessible to employees as well as having enough security measures to keep the data safe. The knowledge which is stored must be disseminated or shared to those who need it at the time when they need it, so that they can use that to make good decisions or to perform routine tasks. The results confirm that KM activities of identification, acquisition, storage, dissemination and application influence the efficiency of knowledge management systems. Results also showed that efficient knowledge management systems influence a firm's performance. Firm performance was found to be made up of financial performance, employee performance, innovativeness, firm productivity and customer satisfaction. As efficient knowledge management leads to higher firm performance, more energy must be devoted to improving knowledge related activities in a firm which will help in improving the overall KMS efficiency. The construct reliabilities were found to be higher than 0.8 for all constructs *(Table 4).*

TABLE.3. Average variance extracted

Construct	AQ	ST	DS	AP	ID	KM	FP
AQ	**0.836**						
ST	0.000	**0.625**					
DS	0.001	0.010	**0.613**				
AP	0.108	0.004	0.000	**0.890**			
ID	0.004	0.000	0.000	0.067	**0.724**		
KM	0.062	0.000	0.015	0.000	0.003	**0.711**	
FP	0.108	0.000	0.022	0.021	0.027	0.006	**0.702**

TABLE.4. Construct reliability

Factor	Loadings- λ	λ^2	$\sum \lambda^2$	AVE
Knowledge	0.959	0.9196	3.3475	0.836
Acquisition(AQ)	0.923	0.8519		
	0.867	0.7516		

	0.908	0.8244		
Knowledge	0.699	0.4886	2.5035	0.625
Storage(ST)	0.777	0.6037		
	0.834	0.6955		
	0.846	0.7157		
Knowledge	0.676	0.4569	2.4531	0.613
Dissemination(DS)	0.821	0.6740		
	0.854	0.7293		
	0.770	0.5929		
Knowledge	0.937	0.8779	3.5617	0.890
Application(AP)	0.920	0.8464		
	0.960	0.9216		
	0.957	0.9158		
Knowledge	0.887	0.7867	2.8941	0.724
Identification(ID)	0.900	0.8100		
	0.778	0.6052		
	0.832	0.6922		
Efficient	0.848	0.7191	2.8428	0.711
KM system(KM)	0.908	0.8244		
	0.887	0.7867		
	0.716	0.5126		
Firm	0.740	0.5476	3.5112	0.702
Performance(FP)	0.877	0.7691		
	0.829	0.6872		
	0.884	0.7814		
	0.852	0.7259		

TABLE.5. Discriminant validity

Construct	Reliability
Knowledge Acquisition(AQ)	0.947
Knowledge Storage(ST)	0.866
Knowledge Dissemination(DS)	0.863
Knowledge Application(AP)	0.970
Knowledge Identification(ID)	0.901
Efficient KM system(KM)	0.911
Firm Performance(FP)	0.921

Conclusion

As discussed in previous sections, the major knowledge management activities are knowledge identification, knowledge acquisition, knowledge storage, knowledge dissemination and knowledge application. Organizational performance includes critical components such as productivity, financial performance, employee performance, innovativeness and customer satisfaction. Results showed that knowledge practices have a significant impact on the efficiency of knowledge management systems. Generally, based on our findings, we can say that the improvement of KM practices can play a significant role in improving firm productivity, financial performance, staff performance, innovativeness and customer satisfaction, and thus in improving the overall firm performance. When knowledge requirements are identified, acquired, and stored, organizations can implement this knowledge to explore problems and create solutions, producing a structure for facilitating efficiency and effectiveness. In the modern dynamic and complex environment, firms need to acquire, create, share, save and implement new knowledge in order to make strategic decisions that can lead to improvements in productivity, financial and staff performance, innovation, work relationships, and customer satisfaction. Thus managers should be committed to providing a supportive climate and culture, one that motivates employees and supervisors to implement the mentioned KM practices, in order to achieve better results. This research makes a contribution by providing firms with better insights into KM practices, in order to improve organizational performance. Further, by linking these issues to performance, this study demonstrates the importance of KM for better firm performance. Managers should perceive the benefits of KM practices that can increase firm productivity, financial performance, employee performance, innovativeness and customer satisfaction. Top management should invest in internal and external resources helps in improving knowledge management activities. Improved performance can be one of the long term and strategic benefits of fulfilling KM best practices. Firms should collect information from their customers, suppliers and other stakeholders, organize these collected knowledge through modern informational technologies or even traditional means, share the organized knowledge throughout all organizational levels, and finally implement the shared knowledge to overcome challenges and improve performance.

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