

The effect of knowledge management infrastructure on organizational performance

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Abstract: In today's competitive business environment, knowledge management (KM) is increasingly recognized as a significant factor in gaining a competitive advantage. This study attempts to understand the relationships among KM infrastructure and organizational performance. Data for this study was collected based on a questionnaire that was distributed to the Chief Administrative Officers. This study examined a sample of 40 companies in Iran. Each company received ten questionnaires to answer. Of the 400 questionnaires posted, a total of 260 usable questionnaires were returned, comprising a response rate of 65%. The results show from the full set of 5 KM dimensions, Human capital appears as a leading factor. Technology is the second most important criterion with the importance level of, while Organizational culture is found to be the third important KM dimensions.

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1. Introduction

In the last decade, the importance of knowledge has been highlighted by both academics and practitioners (Wu & Lin, 2009). Nowadays, knowledge is the fundamental basis of competition (Zack, 1999; Grant, 1996) and, particularly tacit knowledge, can be a source of advantage because it is unique, imperfectly mobile, imperfectly imitable and non-substitutable. However, the mere act of processing knowledge itself does not guarantee strategic advantage (Zack, 2002); instead, knowledge has to be managed. In next few years, firms that create new knowledge and apply it effectively and efficiently will be successful at creating competitive advantages. In knowledge economy, enterprises need to adapt and update their knowledge to keep their capability of innovation. Therefore the relationship between the KM and organizational innovation is becoming an important issue in academic and practical areas (Liao & Wu, 2010). Knowledge management as a field of study is concerned with simplifying and improving the process of sharing, distributing, capturing and understanding knowledge.

Knowledge has been recognized as an important source of competitive advantage and value creation (King and Zeithalm, 2003), as an indispensable ingredient for the development of dynamic core competencies and, more generally, as a determinant factor for firms with global ambitions. Moreover, knowledge that firms acquire is a dynamic resource that needs to be nourished and managed carefully. Knowledge management is a growing field of interest in business today. It has become the basic framework of a successful business (Davenport & Grover, 2001) and a critical source of competitive advantage (Dutta, 1997). Knowledge management impacts firm

performance through its efficiency in developing the intellectual assets that are a source of competitive advantage (Ndlela & du Toit, 2001). There are different types of knowledge. The primary distinction among them is tacit knowledge and explicit knowledge (Oliveira, 1999). Recognized widely by organizational scholars, Polanyi (1958) originally advanced this important distinction of knowledge types. The dichotomy between tacit and explicit knowledge can be thought of as the difference between experiential (i.e. tacit) knowledge and articulated (i.e. explicit) knowledge (Simonin, 1999). Tacit knowledge is accumulated through learning and experience; often, it is referred to as 'learning by doing' (Reed and DeFillippi, 1990). A second distinction of knowledge types is between component and architectural knowledge (Henderson and Clark, 1990; Henderson and Cockburn, 1994). Component knowledge regards a particular aspect of an organization's product, process or operation. Architectural knowledge, on the other hand, relates to the various ways in which the components are integrated and linked together into a complete system (Henderson and Clark, 1990).

Knowledge management can assist the adopting companies and the consulting firms through different stages of the enterprise system life cycle. On a general view, enterprise system life cycle involves selecting, implementing, and using the enterprise system. In selecting stage, knowledge management systems could be designed to organize the information regarding different types of enterprise system packages so that firms looking for an ERP package can compare and choose the one that best fits their organizational context and fulfills their requirements. Strategic KM relates to the processes and infrastructures firms employ to

acquire, create and share knowledge for formulating strategy and making strategic decisions (Zack, 2002), thus linking KM strategy to business strategy. A firm's knowledge strategy describes the overall approach an organisation intends to take to align its knowledge resources and capabilities to the intellectual requirements of its strategy, thus reducing the knowledge gap existing between what a company must know to perform its strategy and what it does know (Zack, 1999).

2. Literature review

2.1. Knowledge management

There are many definitions of knowledge (Hildreth & Kimble, 2002) however; most are specific to the context in which they are used. From the KM perspective, Davenport & Prusak (1998) observe: "Knowledge is a fluid mix of framed experiences, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information." (Davenport & Prusak, 1998) While Schreiber et al. (1999), from an engineering perspective, define knowledge as ". . . the whole body of data and information that people bring to bear to practical use in action, in order to carry out tasks and create new information" (Schreiber et al., 1999).

Knowledge management is an emerging field that has commanded attention and support from the industrial community. Many organizations currently engage in knowledge management in order to leverage knowledge both within their organization and externally to their shareholders and customers. KM is an approach to adding or creating value by more actively leveraging the know-how, experience, and judgment resident within and, in many cases, outside of an organization. Knowledge management is a young discipline for which a codified, generally accepted framework has not been established. Skyrme (2001) defines knowledge management (KM) as 'the explicit and systematic management of vital knowledge and its associated processes of creation, organisation, diffusion, use and exploitation'. Knowledge management refers to a systematic and organizational specific framework to capture, acquire, organize, and communicate both tacit and explicit knowledge of employees so that other employees may utilize them to be more effective and productive in their work and maximize organization's knowledge. To add value with knowledge management there is a need for knowledge management systems, which are IT-based systems and facilitate the generation, preservation and sharing of both tacit and explicit knowledge of the organization (Alavi and Leidner, 2001). The increasing importance of knowledge as a critical resource is mirrored by theoretical approaches underlining the relevance of

knowledge. The knowledge-based view of the firm considers knowledge and the ability to integrate individual knowledge in the context of a common task fulfillment to be essential for the creation of competitive advantage (Grant 1996; Spender 1996; Conner and Prahalad, 1996).

2.2. Dimensions of Knowledge management

Knowledge creation/acquisition is the process of generating knowledge internally and/or acquiring it from external sources. It is worth noting that the effective acquisition of knowledge from external sources depends on the ability of the firm to recognize the value of new external information, assimilate it and apply it to commercial ends. Cohen and Levinthal (1990) label this capability a firm's absorptive capacity, which is largely a function of the firm's level of prior related knowledge. According to this perspective, what is just information for some constitutes valuable knowledge for others and vice versa. Successful knowledge acquisition efforts are keys to a firm's overall performance and financial accountability (Moorman & Rust, 1999). Knowledge acquisition efforts enable successful knowledge integration for a high technology firm. A firm's knowledge acquisition capabilities give them a basis to develop competitive advantage (Zahra & George, 2002).

Knowledge storage and retrieval refers to the processes of knowledge structuring and storing that makes it more formalized and accessible.

Knowledge integration is defined as creating, transferring, sharing and maintaining information and knowledge. Knowledge integration is the task of identifying how new and prior knowledge interacts while incorporating new information into a knowledge base (Wijnhoven, 1999).

Knowledge evolution represents the fact that organizations change their knowledge contents to cope with the changing pressure from the environment. Evolution is a strategy that a population uses to cope with the pressures of environmental variation (Burgelman 1991, Usher and Evans 1996). It is a dynamic capability which allows every firm to integrate, build, and reconfigure their competences under a rapidly changing environment (Teece et al. 1997).

Knowledge transfer and sharing refers to the processes of transferring, disseminating and distributing knowledge in order to make it available to those who need it.

Knowledge application can be defined as the process of incorporating knowledge into an organization's products, services and practices to derive value from it.

2.3. Knowledge management and organizational performance

There is a consensus amongst KM researchers that effective KM is a source of competitive advantage and improved performance (Wong, 2004; Darroch, 2005; Tanriverdi, 2005; Young, 2006). However, empirical research in that particular area is still relatively limited when compared with theoretical literature (Akroush, 2006). OP is an indicator which measures how well an enterprise achieves their objectives (Venkatraman and Ramanujam, 1986; Hamon, 2003). OP can be assessed by an organization's efficiency and effectiveness of goal achievement (Robbins and Coulter, 2002). Andersen (2006) states that the concept of effectiveness is a ratio, implying that two entities are required when defining and measuring effectiveness (e.g. return on assets). Choi et al. (2008) analyze KM strategies based on KM source. The result shows that companies could benefit from KM by implementing external- or internal-oriented strategy. That is, combining the tacit-internal-oriented and explicit-external-oriented KM strategies indicates a complementarily relationship, which implies synergistic effects of KM strategies on performance. Afiouni (2007) argues that combining human resource management initiatives with those of KM will help improve OP. Lee and Lee (2007) uncover that there are statistically significant relationships among KMC, processes, and performance.

Tanriverdi (2005) also focused on corporate performance; however, it was measured through the return on assets. While, Tsai and Shih (2004) measured organizational performance through growth, profitability, customer, satisfaction, and adaptability variables. This observation underlines that differences amongst KM and MKM researchers go beyond KM's focus, scope and definition to reach their perceptions on what elements of organizational performance are most affected by KM, and how those elements should be measured.

3. Research methodology

3.1. Logistic regression

In this study logistic regression employed as predictive modeling tool. Regression analysis is a powerful and comprehensive methodology to model the relationships between a response variable, called the dependent variable, and one or more explanatory variables called independent variables. The goal of logistic regression is to find the best model to describe the relationship between a dependent variable and multiple independent variables (Lee, 2005; Ohlmacher and Davis, 2003). Therefore, logistic regression models the probability of presence and absence given the observed values of the predictor variables. The

dependent variable of a logistic regression could be binary or categorical and the independent variables of a logistic regression could be a mixture of continuous and categorical or binary variables. Logistic regression also produces Odds Ratios (O.R.) associated with each predictor value. The "odds" of an event is defined as the probability of the outcome event occurring divided by the probability of the event not occurring. The Odds Ratio for a predictor is defined as the relative amount by which the odds of the outcome increase (O.R. greater than 1.0) or decrease (O.R. less than 1.0) when the value of the predictor variable is increased by 1.0 units.

3.2. Survey instrument

Data were gathered via cross-sectional mail survey using a questionnaire that was essentially composed of questions related to KM practices and organizational performance (this questionnaire Designed by Delen et al., 2013). Respondents were asked to indicate the level of agreement based on five-point Likert scales ranging from 1 "strongly disagree" to 5 "strongly agree". The level of organizational performance measures was identified using judgmental measures based on managers' perceptions of how the organization performed on multiple indicators of organizational performance relative to its rivals based on a five-point scale, ranging from 'much worse than rivals' through 'much better than rivals'. The performance indicators include: service quality as perceived by customer, market share gain over the last one year, reputation among major customer segments, capacity to develop a unique competitive profile, new product/service development, and market development.

3.3. Data collection and sample

Data for this study was collected based on a questionnaire that was distributed to the Chief Administrative Officers. This study examined a sample of 40 companies in Iran. Each company received ten questionnaires to answer. It was requested that the questionnaire be completed by a senior officer/executive in charge of HRM and KM practices. Of the 400 questionnaires posted, a total of 260 usable questionnaires were returned, comprising a response rate of 65%.

4. Analysis and results

This study attempts to understand the relationships among KM infrastructure and organizational performance. Exploratory factor analysis with varimax rotation was performed on the Knowledge Management Infrastructure criteria in order to extract the dimensions underlying the construct. The EFA of the 19 variables yielded five factors

explaining 58.6% of the total variance. Based on the items loading on each factor, these factors were labeled as ‘technology’ (Factor 1), ‘leadership’ (Factor 2), ‘human capital’ (Factor 3), ‘organizational culture’ (Factor 4), and ‘organization structure’ (Factor 5). These items are shown in Table 1.

The reliability of the measurements in the survey was tested using Cronbach alpha. Hair et al. (1998) stated that a value of 0.70 and higher is often “considered the criterion for internally consistent established factors”. The Cronbach alpha values of reliability for the underlying factors range from 0.74 to 0.88 suggesting satisfactory level of construct

reliability. The confirmatory factor analysis (CFA) technique is based on the comparison of variance-covariance matrix obtained from the sample to the one obtained from the model. The measurement model results are presented in Table 1. It was found that all t-values in the CFA are statistically significant at 0.01 levels. It indicates that all the individual factor loadings to be highly significant, giving support to convergent validity. For the purposes of the study, we used well-known performance measures such as overall accuracy, Recall and F-measure. These items are shown in Table 2.

Variables	Factors					Regression weight	t-Value
	1	2	3	4	5		
Technology	0.64					0.81*	22.1
Information systems in our corporate are convenient for our needs.							
Information technology systems in our corporate are new and fast.	0.78					0.79*	21.3
Our corporation has an efficient information system to be used for KM strategies.	0.68					0.75*	20.2
Our corporation has adequate database systems.	0.59					0.73*	20.1
Leadership							
Our managers encourage us to learn more about KM.		0.82				0.76*	20.3
Our managers are good representatives of KM implementers.		0.75				0.74*	20.2
Our managers are supportive in developing, using, and sharing the knowledge.		0.77				0.71*	19.6
In our corporation, top management weighs much importance on the KM.		0.63				0.69*	18.4
Human capital							
Managers and employees of our corporate are experienced in their jobs.			0.81			0.67*	18.5
Managers and employees of our corporate have enough technical knowledge in their domains.			0.74			0.65*	18.3
Our corporate conducts adequate number of training activities.			0.69			0.66*	18.4
I can identify employees of our corporate as “highly qualified knowledge management individuals”.			0.68			0.59*	17.5
Organizational culture							
Our corporate culture encourages teamwork.				0.66		0.58*	17.3
Our corporate culture supports the idea of cooperation and knowledge sharing.				0.75		0.60*	18.5
Our corporate culture encourages knowledge creation.				0.77		0.48*	14.2
We trust in our colleagues and managers.				0.78		0.43*	13.4
Organizational structure							
There is not a rigid chain of command between different levels of management.					0.68	0.75*	17.6
There are no problems in terms of establishing and sharing authority and responsibility.					0.65	0.74*	16.8
Without any hesitation, I can do my own initiative regarding my job within my authority.					0.59	0.71*	15.7
– Fixed for estimation. * p<0.01.							

Accuracy	Sensitivity/True Positive rate or recall	False Positive rate	Specificity/True Negative rate	False Negative rate	Precision	F measure
0.752	0.696	0.182	0.742	0.258	0.818	0.752

The impact of KM dimensions on organizational performance was evaluated and ranked. This also provides managers with invaluable information in identifying which KM dimensions they should

concentrate in order to have a better organizational performance. Table 3 shows the contribution of KM dimensions to the organizational performance in terms of the degree of their importance levels and their

respective rankings. From the full set of 5 KM dimensions, Human capital (0.312) appears as a leading factor. Technology is the second most important criterion with the importance level of 0.255,

while Organizational culture is found to be the third important KM dimensions with the importance level of 0.204.

Table 3. Importance of KM infrastructure on the organizational performance

KM infrastructure	Importance level	Ranking
Human capital	0.312	1
Technology	0.255	2
Organizational culture	0.204	3
Leadership	0.165	4
Organizational structure	0.064	5

7. Conclusion

Our study analyzed the effects of KM on organizational performance. The results indicate that KM practices are positively associated with OP as generally suggested by the KM literature, both qualitative (Massey et al., 2002; Nonaka, 1994) and quantitative (Choi and Lee, 2003; Schulz and Jobe, 2001; Tanriverdi, 2005). Given the importance of organizational knowledge, many companies have been trying to influence the acquisition, sharing and application of knowledge (Coombs and Hull, 1998; DeCarolis and Deeds, 1999; Von Krogh et al., 2001). Al-Busaidi and Olfman (2005) examined the effects of knowledge culture, organizational infrastructure, technical infrastructure, management support, vision clarity, reward policy and economic return on performance measures such as organizational efficiency, customer satisfaction, decision making, quality improvement, and financial benefits. The authors found evidence of a positive correlation with the successful implementation of KM systems in business organizations.

The results show from the full set of 5 KM dimensions, Human capital appears as a leading factor. Technology is the second most important criterion with the importance level of, while Organizational culture is found to be the third important KM dimensions. The main contribution of the paper is to provide empirical evidence about the impact of KM on organizational performance. Also the findings of the study are important for both practitioners and academics. The most important limitation of this study is that it comprises only one sector in Iran. Furthermore, even though the sample size seems to be satisfactory, a larger number of participants would have made the study stronger.

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