

Knowledge Management Implementation in IZGAZ

Halil Zaim*

Abstract. Managing knowledge efficiently and effectively is considered a core competence for organizations to survive in the long run. The capability of organizations to leverage their knowledge resources seems to be one of the most important parameters from the strategic perspective. Nevertheless, the evolution and implementation of Knowledge Management (KM) is still in its infancy in Turkey, leading to the difficulty in composing a comprehensive and applicable KM framework for organizations in Turkey. This study analyses KM implementation in a local natural gas distributor and aims to clarify basic KM processes and their comparative effects on KM performance.

Purpose – The main purpose of this study is to disclose the core processes of KM and figure out the relationship between these processes and the KM performance based on the data collected from IZGAZ in Turkey.

Design/Methodology/Approach – This study uses the data from 70 employees in IZGAZ.

Findings – This study reveals that there is a positive relationship between KM processes and KM performance. Furthermore, among the three main processes of KM, knowledge sharing and distribution has more impact on KM performance than knowledge generation and development and knowledge codification and storage.

Originality/value – This study aims to construct a useful KM model for scholars and practitioners regarding the three main processes. The findings of this study emphasize the importance of knowledge sharing and distribution particularly for organizations in the services sector.

JEL Classification Codes: D20, D29.

Keywords: Knowledge Management, Knowledge Management Processes, Knowledge Generation, Knowledge Sharing, Knowledge storage.

* Faculty of Economics and Administrative Sciences, Fatih University, Istanbul, Turkey

1. Introduction

The rise of the knowledge economy and the socio-economic transformation of societies have resulted in knowledge being the fundamental means of wealth and prosperity (Drucker, 1993; Hope and Hope 1997; Bozbura, 2007). From a business perspective, knowledge seems to be a key factor for an organizations' success in the long run (Mansell and When, 1998; Stewart, 2001; Tat and Hase, 2007). Hence, leveraging knowledge resources effectively and efficiently is vital in order to gain a competitive advantage and to ensure the sustainable development for societies, as well as for the organizations (Nonaka, 1998; Davenport and Prusak, 1998; Storey and Barnett, 2000). A variety of case studies, (Gepeda, 2007; Eppler and Burkhard, 2007; DeSouza and Awazu, 2006) applications (Marques and Simon, 2006, Park and Kim, 2006) and a rich literature support the belief that knowledge management (KM) plays a significant role in managing business successfully (Cortes, et. al., 2007)

The studies in the field of KM has largely focused on three major streams (Geisler, 2007): the nature of knowledge; the processes of KM such as generation, sharing, distribution of knowledge; and the infrastructure of KM such as technological, organizational or managerial issues for managing knowledge effectively.

In this study, the concept of KM is analyzed in terms of its processes. Hence, the main purpose of this study is to compose a useful and comprehensive model for KM in terms of its core processes and analyze the empirical evidence regarding these processes on KM performance, based on data collected from IZGAZ in Turkey.

2. Literature Review

Recently, the field of knowledge management has emerged as an area of interest in the academic and organizational practice. The literature reveals a rapidly increasing number of studies and researches covering many different disciplines and areas of interest to academicians and practitioners (McAdam and Mcreeedy, 1999). There is a vast number of definitions with more or less common characteristics (Lytras, et al., 2002) and emphasizing several different aspects of KM. Obviously to review all the definitions and aspects of KM is beyond the scope of this study. It will be useful however, to draw attention to a select few.

According to Malhotra (2000): “*KM embodies organizational processes that seek synergetic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings*”. Malhotra (2000) also mentions that KM requires re-consideration of everything in the organization and caters to the critical issues of organizational adaptation, survival and competence in the face of increasing discontinuous environmental change.

Guthrie on the contrary, emphasizes the importance of intellectual capital and defines KM as “*management of the intellectual capital controlled by the company*” (Martensson, 2000). Sveiby focuses on the value of intangible assets and defines KM as “*the art of creating value from an organization’s intangible assets*” (Beijerse, 1999). Gottschalk, underlines the ownership of knowledge and according to his point of view, KM is “*unlocking and leveraging the knowledge of individuals so that this knowledge becomes available as an organizational resource that is not dependent on those same individuals*” (Gottschalk, 2000).

O’Dell brings another perspective to the field by describing KM as “*a conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to improve organizational performance*”. Backman, defines KM as “*the formalization of and access to experience, knowledge and expertise that create new capabilities, enable superior performance, encourage innovation and enhance customer value*” (Lytras, et al., 2002).

Keeping all of these in mind, it is possible to compose a more process-oriented definition of KM such as: “KM is the systematic management of all activities and processes referred to generation and development, codification and storage, transferring and sharing, and utilization of knowledge for an organization’s competitive edge”.

It has been argued that the effectiveness of KM depends on how the generation of new knowledge is organized and how existing knowledge is transferred throughout the organization. Recent studies have expressed considerable interest in knowledge sharing practices (Hicks, et, al., 2007), and benefits of knowledge transfer and sharing have been discussed widely among scholars and practitioners (Sveiby and Simons, 2002). Therefore, one of the most important objectives of KM is to bring together intellectual resources and make them available across organizational boundaries. It has been suggested that organizations often waste their resources and lose a

significant amount of money by repeating the same mistakes, duplicating projects and being unaware of each others' knowledge due to the lack of knowledge transfer and sharing throughout the organization (Robertson, 2002).

Nonetheless, knowledge transfer is not a one directional movement of knowledge. Effective knowledge transfer is more than the movement of knowledge from one location to another. It is proposed that organizations can gain significant learning benefits through transferring knowledge between units and people (Riege, 2007). It tends to improve competence of both sides that transfer and share knowledge. This is because knowledge does not leave the owner when it has been transferred. As a result, the value of knowledge grows each time a transfer takes place and the key to value creation lies in how effective knowledge has been transferred throughout the organization (Sveiby, 2001).

There is a variety of methods that can be chosen according to the similarity of task and context, the nature of task; how routine and frequent the transfer and the type of knowledge that is being transferred. Dixon argues that one of five different methods of knowledge transfer, namely, "serial transfer", "near transfer", "far transfer", "strategic transfer", and "expert transfer", should be chosen according to the factors mentioned above (Dixon, 2000). Sveiby, on the other hand, posits nine different transfer strategies regarding both to the internal and the external structure of the organization (Sveiby, 2001).

In addition to this, there are three main approaches to knowledge transfer in terms of technology and organizational culture. The first approach emphasizes the importance of the technological means and tools for an effective knowledge transfer. The second focuses more on social interactions and underlines the importance of cultural aspects. The third approach is a comprehensive one that aims to combine the technological perimeter with the socio-cultural perimeter of KM.

The role and importance of information and communication technologies in knowledge transfer have been emphasized by many scholars. Clearly, technological advances bring a vast number of new opportunities to transfer and share knowledge and expertise throughout the organization within departments, plants, countries and across national borders. These technologies have a strategic role in knowledge sharing specifically for geographically dispersed global organizations (Bender and Fish, 2000). The

effective use of technologies creates new ways of knowledge transfer and holds promising solutions both in transfer of explicit knowledge and tacit knowledge; in terms of experience and expertise (Jacop and Abrahamipur, 2001). In this respect, these technologies have a strategic importance not only in knowledge transfer inside the organization but also knowledge transfer among different organizations (Zhao and Xie, 2002).

However, formal or informal social processes and cultural issues are just as important as technological systems in knowledge transfer and sharing. Establishing advanced technological systems does not necessarily make people transfer and share knowledge in an organization. It is the type, quality and frequency of social processes and the structure of organizational culture that do. In addition to the formal social processes that can be controlled and managed to some extent, spontaneous, unstructured knowledge transfer is also vital for an organization's success. For this reason, it is necessary to develop dedicated strategies to encourage such spontaneous knowledge exchanges and a special emphasis should be given to informal relations (Davenport and Prusak, 1998). This is essential specifically in transferring tacit knowledge such as experience or expertise which requires time, face-to-face interactions and sophisticated social processes.

Keeping all these in mind, knowledge management strategies seek a synergic combination of technological systems with socio-cultural processes. The socio-technical view of knowledge sharing at Buckman Laboratories can be considered as a good example of this view (Pan and Scarbrough, 1998).

At the same time, it is generally agreed that at present, the only sustainable competitive advantage for a firm comes from the value it can generate from its knowledge resources (Beveren, 2002). It has been stated that in today's turbulent environment and blurry market conditions, it is the ability of organizations to originate novel and useful ideas and solutions that makes sense. Consequently, knowledge generation that includes all activities by which new knowledge is generated for the organization's benefit (Abou-Zeid, 2002) is a crucial but a difficult process to manage (Söderquist, 2006).

All healthy organizations generate knowledge. While they are interacting with their environment, they absorb information, combine it with their experiences, values and internal rules, turn it into knowledge, and take action based on it. But what is referred to as the knowledge generation process, is the conscious and intentional generation of knowledge under

specific activities and initiatives firms undertake to increase their stock of corporate knowledge (Davenport and Prusak, 1998). Generating knowledge can be performed in many ways. The main three modes among these are knowledge acquisition, knowledge generation within the firm and collaborative knowledge generation.

The knowledge generation process does not necessitate new knowledge generation. In many circumstances, organizations may prefer to acquire knowledge from other sources and adopt it for their own use (Bhatt, 2000). Acquiring knowledge is important in two aspects. Firstly, it can be used for knowledge creation. Secondly, if it is novel and useful for the organization, it can also be regarded as a part of knowledge generation. Organizations convert information they collect from internal and external sources into knowledge through their organizational learning process by combining it with their prior knowledge, experiences, values and organizational procedures (Hong, 1999). Then, the knowledge becomes a part of their organizational knowledge base. This is why the knowledge acquired through organizational processes is new and unique for a particular organization. (Krogh and Roos, 1996).

Organizations acquire knowledge in several ways. Imitation, benchmarking, replication, substitution, purchasing, outsourcing and discovering are some of the various methods of knowledge acquisition (Bhatt, 2000; Abou-Zeid, 2002; Zaim, 2000).

Although acquiring useful knowledge is an important mode of knowledge generation, many consider that the real competitive advantage comes from the capability of an organization to generate new knowledge within the organization. In this context, the key success factor has been shifted from information processing to knowledge creation and continuous innovation (Malhotra, 2000). Knowledge creation is not a systematic process that can be tightly planned and controlled. It can even be considered as the least systematic process of KM. The process is continuously evolving and emergent and motivation, inspiration and pure change play an important role (Bhatt, 2000). In addition, it has been widely accepted among scholars that organizational knowledge creation is heavily influenced by social processes. Thus, in the well-known knowledge creation model of Nonaka and Takeuchi – SECI – three of the four distinct phases, namely, socialization, externalization and combination, involve extensive social interactions among organization members (Chua, 2002).

Knowledge development on the contrary, requires a more systematic, disciplined and sustained effort. It is the process of either converting the innovative and creative ideas into actions, goods and services or the development of goods and services for a higher customer value.

Producing creative ideas does not always lead to useful knowledge and innovation. This is why one of the main objectives of KM is to increase the percentage of the creative ideas that are converted to innovations (Skyrme, 1999). In this regard, the knowledge-creating company is the one that can convert individuals' creative ideas to useful solutions and innovations throughout the organizational processes based on conversion of knowledge between tacit and explicit forms. From this point of view, to create new knowledge requires the company and everyone in it to be in a non-stop process of personal and organizational self-renewal (Nonaka, 1998). In other words, the process of knowledge generation and development not only requires organizations to alter their cognitive frameworks, but also forces organizational members to view reality in new perspectives (Bhatt, 2000). That is why to achieve better results innovative effort has to be strategically combined with a competitive orientation and its consequent movement (Carneiro, 2000).

A conventional method of knowledge generation and development within the organization is establishing specific units or groups for that purpose such as research and development departments (Davenport and Prusak, 1998). Statistical analyses show that research and development investments in the private sector have been increasing continuously in all of the OECD countries in the last decade (OECD, 2002). Another significant tendency in research and development is that the research and development activities are shifting outside the company borders. For example, some of the firms like Ernst & Young, Andersen Consulting or IBM Consulting have been establishing research and development centers or institutes while some others like Motorola, Merck and McDonalds' have been founding universities for this purpose (Davenport and Prusak, 1998).

Nonetheless, according to many authors including Nonaka, generating new knowledge cannot be a specialized activity of a single unit or department – such as a research and development department – but rather it is a way of behavior and a mindset including all the departments and every single person in the organization (Nonaka, 1998).

The scope of knowledge generation and development activity today is moving beyond the organizational borders. This is because the process of knowledge generation and development is becoming more and more complicated and expensive and companies cannot cope with it on their own. As a result, organizations tend to collaborate with other organizations, groups or individuals, including their customers.

The types of partnership for knowledge generation and development vary from simple ones such as a sole partnership between two firms, to more complicated and complex networks. It is not only the organizational structure but also the knowledge relationship that is varying. In some cases, knowledge relationship is structured, formal and based around pooled knowledge sharing; whereas in other cases the interactions are unstructured, evolving and dependent upon high levels of communications, and trust (Skyrme, 1999).

Knowledge sharing generation is extremely important. Knowledge is meaningful when it is codified, classified, given a shape, put in a useful format and stored. Only then, can it be used by the right person, at the right time, in the right way. Storage and codification of knowledge is not only important for an effective use of knowledge but also it is important for re-using it when needed so that the knowledge in question is going to belong to the organization rather than the knower (Nemati, 2002). This is why a stream of researches have been concentrating on the classification and the codification of knowledge according to its type and purpose – in favor of the organizational objectives and priorities – and the storage of knowledge for the access of the employees at present and in the future. The codification of knowledge is also useful in revealing the inventory of the knowledge resources and potential of the organization.

Despite its significant importance, codifying and classifying knowledge is not that simple. This is mainly because knowledge is what people know. Thus, it cannot be hundred percent clarified and expressed. It is also vital to remember that organizational knowledge is dispersed and scattered throughout the organization. It is found in different locations, in people's minds, in organizational processes, in corporate culture; embedded into different artefacts and procedures and stored into different mediums such as print, disks, and optical media (Bhatt, 2001). It is difficult to capture and identify the knowledge dispersed throughout the organization and to clarify what an organization exactly knows.

Knowledge codification and classification according to purpose, type and importance of knowledge, is necessary for filtering and eliminating the knowledge and information “heap” (Lueg, 2001). Another important aspect is that the codification process should be appropriate to the organization’s overall goals and objectives. The most challenging feature of codification is to capture, codify and store the knowledge without losing its distinctive properties which makes it valuable (Davenport and Prusak, 1998).

Meanwhile, one of the most serious problems in codifying knowledge is the codification of tacit knowledge. This difficulty arises from the very nature of tacit knowledge which is subjective, situational, and intimately tied to the knower’s experience. Consequently, unlike explicit knowledge, tacit knowledge cannot be formalized, documented and communicated easily (Chua, 2002, “Taxonomy”).

Despite the fact that technological advances create new opportunities to codify tacit knowledge to some extent, the easiest and the most accurate way to codify it is to match the knowledge seeker and the knower through knowledge maps. These maps, showing the type of knowledge and expertise that exist in the organization and where they are located, are useful tools for codifying and classifying tacit knowledge (Davenport and Prusak).

The distinction between tacit and explicit knowledge is also considerable in storage of knowledge. Explicit knowledge can be easily collected, documented, stored and retrieved quite independently of any single individual through technological means and systems. On the other hand, a great deal of an organization’s knowledge resources resides in the minds of its workers as personal tacit knowledge (Drott, 2001) which is hard to store. If the organization’s knowledge resources is described as an iceberg, the explicit knowledge is the visible part of the iceberg above the surface but the tacit knowledge is the invisible part of the iceberg beneath the surface (Herrgard, 2000).

The limited storage of tacit knowledge can be accomplished in two ways. One way is storing tacit knowledge by converting it to an explicit form. The other way is to store the tacit knowledge in people’s minds by sharing and disseminating.

Even though a lot of efforts have been made to convert tacit knowledge such as taking advantage of the narratives (Linde, 2001),

artefacts (Kreiner, 2002) or other implementations like “knowledge exchange protocols” (Herschel, 2001), the most effective way of storing tacit knowledge is to store it via the social processes and personal face to face interactions. In this case, different methods, varying from conventional ones as apprenticeship, mentoring and action learning to more advanced ones such as networking and video conferencing, can be useful (Herrgard, 2000; Davenport and Prusak, 1998).

3. Research Hypothesis

In this study KM processes are considered as 3 factors effecting KM performance. According to this, our hypotheses are:

H1: KM performance improves if KS&D is augmented.

H2: KM performance improves if KG&D is augmented.

H3: KM performance improves if KC&S is augmented.

4. Research Methodology

Survey setting

The energy sector has become one of the most strategic sectors in the global economy in the last few decades. Knowledge management is acknowledged as a core competence for the energy providing companies. This is mainly because, the sector, in particular, requires advanced knowledge utilization. Energy providing companies are supposed to be knowledge-oriented companies that are expected to apply the latest technologies. They have to gather and generate knowledge continuously, and disseminate it throughout the organization and utilize it wisely, in order to satisfy the sophisticated needs of their customers while using the energy resources in the most efficient way. Hence, knowledge management implementation in the energy sector is seen as an attractive issue both for academicians and for practitioners.

IZGAZ, is a promising organization in the energy sector in Turkey, which is why it has been chosen as a case study for knowledge management activities. IZGAZ is a company which distributes natural gas (NG) in the metropolitan city of Kocaeli, with the exception of the Gebze and Karamürsel districts. Kocaeli, situated in the Marmara region, is a crossroad between Asia and Europe. This company is a subsidiary company of the Kocaeli Metropolitan Municipality.

IZGAZ was founded by the Izmit Metropolitan Municipality in 1992 and has been given the rights to distribute and sell natural gas in those areas. IZGAZ has ISO 9001, ISO 14001, OHSAS 18001 Certificates. It is a member of IGU (Union of International Gas) and EUROGAS (Union of European Gas). IZGAZ is the only company in the world which has carried natural gas to 1700m.

Survey Instrument

The survey instrument is composed of questions relating to the knowledge management processes. The conceptual definition of construct was adopted from the literature survey and work of Zaim *et al.*, (2007) They developed a multi-item scale to operationalize the knowledge management process construct in a manufacturing context. The questionnaire was finalized after discussion with a panel of experts and academicians. Each item was rated on a five-point Likert Scale anchored at the numeral 1 with the verbal statement “strongly agree” and at the numeral 5 with the verbal statement “strongly disagree”.

The Sample

The sample of this research was determined using judgmental sampling which is a form of convenience sampling in which the population elements are selected based on the judgment of the researcher. Convenience sampling attempts to obtain a sample of convenient elements where the selection of sampling units is left primarily to the interviewer. This technique is recommended for less expensive and less time consuming researches.

Data for this study was gathered using 2 different methods: a written survey, distributed to 70 employees mostly engineers and experts and in-depth interviews with a focus group composed of managers from different levels. The latter was carried out to validate the questionnaire and to gain more in-depth insights in KM practices of the company.

There are some limitations. First of all, the conclusions of the research are valid only for the company in question and cannot be generalized. Secondly, the researchers selected the interviewees only after consulting with the executive managers of the firm. The interviewees selected are the ones who are easy to access and who are assumed to represent the population.

5. Results, Analysis and Discussions

The data analysis was conducted in three steps:

1. Performing an exploratory factor analysis (EFA) with varimax rotation to determine the underlying dimensions of the knowledge management process construct.
2. Testing of the measurement models for each construct using confirmatory factor analysis (CFA) in order to determine if the extracted dimensions in step 1 offered a good fit to the data.
3. Measuring the direct impact of KM process on the KM performance using partial least squares analysis.

Exploratory Factor Analysis (EFA)

The EFA on the 12 knowledge management process items yielded 3 factors with eigen values greater than 1 and explaining 66% of the total variance, as shown in Table 1. From the full set of items only 16 were loaded on these 3 factors. Based on the item loadings, these factors were respectively labeled as *knowledge sharing and distribution (KS&D)*, *knowledge generation and development (KG&D)*, and *knowledge codification and storage (KC&S)*. The reliability of the constructs was assessed using Cronbach's alpha. Alpha values equal to or greater than 0.70 indicate high construct reliability. The Cronbach's alpha measures of reliability for the three factors were 0.88% for KS&D, 87% for KG&D, and 72% for KC&S. All alpha values are above the traditionally acceptable value of 0.70 in research. Similarly, Dillon-Goldstein's ρ analysis provides ρ values that are well above 0.70 for each knowledge management construct supporting unidimensionality.

Table I. EFA of the KM Process

<i>Variables</i>	<i>Factors</i>		
	<i>KS&D</i>	<i>KG&D</i>	<i>KC&S</i>
level of sharing knowledge about market	0,83		
level of sharing knowledge about products and services	0,78		
level of sharing tacit knowledge	0,77		
level of organization-wide knowledge sharing	0,71		
level of group-based knowledge sharing	0,62		
level of electronic based knowledge sharing and distribution	0,57		
level of individual-based knowledge sharing	0,44		
level of research and development		0,81	
level of technological development		0,72	
level of discussing and developing new ideas		0,68	
level of knowledge generation (organization-wide)		0,62	
level of innovative efforts		0,55	
level of knowledge utilization		0,54	
level of knowledge storage			0,82
level of knowledge codification			0,69
level of knowledge access (content validity)			0,49

Confirmatory Factor Analysis (CFA)

This stage is also known as testing the measurement model, where the knowledge management process construct is tested using the confirmatory factor model to assess construct validity using the method of maximum likelihood. The results consistently supported the factor structure for this construct as noted earlier. The CFA technique is based on the comparison of a variance-covariance matrix obtained from the sample to the one obtained from the model. The technique is quite sensitive to sample size, and it is recommended to have several cases per free parameter.

The confirmatory analysis showed a good fit which is given in Table 2. The χ^2 statistic was 75.130 (degrees of freedom=60, $p>0.05$), which indicated non-significance. The χ^2/df ratio was found to be 1.252, which is less than 2.0 (it should be between 0 and 3 with lower values indicating a

better fit). The goodness of fit index (GFI) was 0.872 and adjusted goodness of fit (AGFI) index was 0.806. These scores are very close to 1.0 (a value of 1.0 indicates perfect fit). The Comparative Fit Index (CFI) was 0.965, Tucker-Lewis coefficient (TLI) was 0.954. All of the indices are quite close to a value of 1.0 in confirmatory analysis. In addition to that, the root mean square residual (RMS) was found to be 0.063 which is close to zero. Therefore, the measurement models provide good support for the factor structure determined through the exploratory factor analysis. The model parameters were estimated using the method of maximum likelihood.

The measurement model results are presented in Tables 2. Table 2 exhibits the standardized regression weight between each manifest variable and its corresponding latent variable. During the confirmatory factor analysis, four variables were removed from the analysis to fit the data set. We found that all t-values in the CFA were statistically significant ($p < 0.01$). The results attest to the construct validity for the measurement models of the knowledge management construct. If all the factor loadings of indicators on their constructs were significant, convergent validity is indicated. Table 2 shows that the factor loadings were all statistically significant, indicating strong convergent validity.

TABLE 2. CFA of KM

Symbol	Variables	Standardized Regression weight	t-value*
<i>KS&D</i>			
	level of sharing knowledge about market	0.58	3.88
	level of sharing tacit knowledge	0.80	4.76
	level of group-based knowledge sharing	0.65	4.14
	level of electronic based knowledge sharing and distribution	0.75	4.56
	level of individual-based knowledge sharing	0.56	–
<i>KG&D</i>			
	level of research and development	0.68	5.48
	level of technological development	0.70	5.69
	level of knowledge generation (organization-wide)	0.74	5.99
	level of innovative efforts	0.84	5.96
	level of knowledge utilization	0.74	–
<i>KC&S</i>			
	level of knowledge storage	0.74	–
	level of knowledge codification	0.68	4.73

*All values are significant at the 0.01 level.

- Fixed for estimation

Path Analysis

In order to avoid multi-collinearity and measurement errors, while addressing the cause-effect relationships among the research constructs, we utilized the partial least squares (PLS) method, which is a variance-based structural equation modeling approach. The PLS procedure, developed by Wold (1985), uses two stage estimation algorithms to obtain weights,

loadings and path estimates. In the first stage, an iterative scheme of simple and/or multiple regressions contingent on the particular model is performed until a solution converges on a set of weights used for estimating the latent variables scores. The second stage involves the non-iterative application of PLS regression for obtaining loadings, path coefficients, mean scores and location parameters for the latent and manifest variables. For calculating the PLS procedure Spad Decisia V56 statistical data analysis software was employed (Fornell and Cha, 1994; Tenenhaus *et al.*, 2005; Zaim *et al.*, 2007).

Outer Model Estimation

Outer model, also known as measurement model, links the manifest variables to their latent variables. The outer model estimation results are shown in Table 3. The correlations between the manifest variables and their related latent variables were found to be very satisfactory. A communality measure, which is also an R-square value, is the squared correlation between the manifest variable and its own related latent variable. It measures the capacity of the manifest variables to describe the related latent variables. The communality measure is expected to be close to or higher than 0.60 for each manifest variable. In this application with the exception of *level of group based knowledge sharing* and *level of individual based knowledge sharing*, all of the communality scores indicate that the manifest variables are very capable of estimating the change in related latent variables.

Table 3. Outer Model Estimation Results

Symbol	Variables	Outer weight	Communality
<i>KS&D</i>			
	level of sharing knowledge about market	0.2724	0.6862
	level of sharing tacit knowledge	0.3007	0.8117
	level of group-based knowledge sharing	0.1934	0.4415
	level of electronic based knowledge sharing and distribution	0.2301	0.5839
	level of individual-based knowledge sharing	0.1749	0.4120

KG&D			
	level of research and development	0.2374	0.5998
	level of technological development	0.2891	0.6633
	level of knowledge generation (organization-wide)	0.2960	0.6849
	level of innovative efforts	0.2380	0.6227
	level of knowledge utilization	0.2514	0.5772
KC&S			
	level of knowledge storage	0.5775	0.7343
	level of knowledge codification	0.5605	0.7699

Inner Model Estimation

The hypothesized relationships as shown in Figure 1 were tested. Table 4 shows the estimation results for the inner model. Following the parameter estimation, bootstrapping was also undertaken to confirm the robustness of the findings. To do this, 1000 Bootstrap samples were built by re-sampling with replacement from the original sample. The summary results for bootstrapping were provided in the last column of Table 4. The bootstrap estimated coefficients of inner model are very close to those estimated by PLS.

Table 4. Outer Model Estimation Results

Model	R ²	t-value	p-value	Bootstrap Estimated Coefficients
$\eta_1 = 0.1412 + 0.459 \xi_1 + 0.301 \xi_2 + 0.182 \xi_3 + \zeta_1$	0.66	4.606 (for ξ_1)	0.001 (for ξ_1)	0.437 (for ξ_1)
		2.742 (for ξ_2)	0.001 (for ξ_2)	0.314 (for ξ_2)
		2.102 (for ξ_3)	0.05 (for ξ_3)	0.192 (for ξ_3)

*All values are significant at the 0.05 level

Table 4 presents the results of the structural model related to three hypotheses. The model has one endogenous variable (dependent variable), which is labeled as KM performance and three exogenous variables (independent variables), which are labeled as *knowledge sharing and distribution* (KS&D), *knowledge generation and development* (KG&D), and *knowledge codification and storage* (KC&S). This model evaluates the impact of *knowledge sharing and distribution* (KS&D), *knowledge generation and development* (KG&D), and *knowledge codification and storage* (KC&S) on KM performance. Based on the test results, the overall model explains approximately 66 percent of the variation in KM performance.

Of the KM process factors, *knowledge sharing and distribution* was found to be the most important criterion with the value of its standardized regression weight being 0.459 ($p < 0.001$) followed by *knowledge generation and development* which also has a significant effect ($\beta = 0.301$; $p < 0.001$) on KM performance. In contrast, *knowledge codification and storage* ($\beta = 0.162$; $p < 0.05$) has comparatively less impact on KM process. This finding is not particularly surprising in KM studies as applications have been primarily focused on knowledge generation and sharing rather than knowledge codification and utilization. However, it should be recognized that the factors comprising the KM process are interrelated. That is; in order to improve KM process the constituent factors should be considered as a whole. All of the hypotheses indicated that *knowledge sharing and distribution* (KS&D), *knowledge generation and development* (KG&D), and *knowledge codification and storage* (KC&S) had a positive impact on knowledge management performance.

6. Conclusion and Managerial Implications

There is a significant interest in KM by academicians, researchers and practitioners. However, the application of KM in Turkey is not well structured yet. As a result, it is not easy to construct a useful KM model for organizations in Turkey.

First of all, this study intends to clarify the core processes of KM and establish a useful KM model for organizations in Turkey. The empirical evidence shows that three main KM processes, namely, knowledge sharing and distribution, knowledge generation and development, and knowledge codification and storage, can be constituted into a useful model.

Secondly, this study examines the relationship between KM processes and KM performance. In theory, it has been generally accepted that KM processes have great influences on KM performance (Zaim et. al., 2007; Goll et. al., 2007). However, there is less empirical evidence verifying this acceptance. The findings of this paper confirm the positive correlation between the processes and performance of KM.

Thirdly, the comparative importance of the KM processes has been analyzed. Contra the existing KM literature, knowledge sharing and distribution appeared to be the most significant process of KM practices whereas knowledge generation and development came next. This is partially due to the sector of the company (IZGAZ) in question. It is possible that in the manufacturing sector, knowledge generation and development is the most important process of KM but in the services sector it is knowledge sharing and distribution that has the most significant impact on KM performance.

Furthermore, the findings reveal that the level of sharing knowledge, level of research and development and capability of knowledge storage are the key elements of KM activities in IZGAZ.

For further study, it is suggested that these results be compared with data collected and analyzed from different sectors. Moreover, there is a necessity to connect KM performance with an organization's overall performance. Finally, it would be useful to evaluate the components of each factor of KM processes in order to supplement the literature and to complete a comprehensive KM model.

Finally, even though KM is one of the most promising issues of the newly emerging knowledge era, it requires a phenomenal change of understanding for the practitioners as well as for the academicians. One thing that is certain is that if organizations in Turkey intend to survive global competition, they have to give more emphasis to KM applications.

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Figure I. Conceptual Model

