An Empirical Test of the Knowledge Management Life Cycle Model at a Turkish Petroleum Oil Industry Firm

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Abstract: Most of the knowledge management life cycle models (KMLCM) in the literature are not only focusing on the processes of knowledge in organizations but also emphasizes the role of knowledge. The theoretical background of this study is based entirely on Sagsan's (2007) "A New Knowledge Management Life Cycle Model" (KMLCM), which are sequentially constituted at the five fundamental processes of knowledge such as creating, sharing, structuring, using and auditing with subtitles at the organizational level. Knowledge creating includes tacit and explicit dimensions of knowledge; knowledge sharing could be succeeded through establishing social and technological communications infrastructure channels; knowledge could be structured organized via knowledge mapping techniques as well as knowledge retrieval and storage systems; knowledge could be used for organizational products, services and decision making process. The last step of KMLCM is knowledge auditing, which allow us to control knowledge capacity in the organization based on the organization's intellectual capital and knowledge assets. This study aims at testing this model at the oil indıstry firms, which are distributing Turkish Petroleum (TP) oils as a dealer in Turkey. It is also well-known Turkish Petroleum brands. Thus, the empirical test of the study will prove the findings in the way of applying knowledge management strategy in this firm. The results were discussed by considering each of the knowledge management processes/stages. The findings about implementing KMLCM in the firm are also differentiated at twofold. The first is about the stage of organizational life cycle (deliberate, institutionalized, innovative, rationalized, entrepreneurial) and the second is about the organizational structure such as formalization, centralization, professionalization, specialization and size. In conclusion, it could be said that both organizational life cycle stages and organizational structure variables are directly related to implement KMLCM in the firm. At the end of the study, two fundamental questions were designed for the future research.

Keywords: knowledge management life cycle models, knowledge processes, knowledge management applications, organizational structure, organizational life cycle, Turkish Petroleum Oil Industry Dealer Firm

1. Introduction

One of the most important subtopic of knowledge management discipline in the literature strongly emphasizes on the processes of knowledge at the individual, organizational and inter organizational level. The purpose of these processes is to underline the ideal knowledge management models for the individual and organizational effectiveness. However, every model reflects its own cycle/step based on its capacity and contains knowledge hierarchy, cognitive model, maturity model, innovativeness process, etc. The cycles/steps of knowledge management models could be evaluated in the direction of scholars' point of view or specific terminology and could be created new understandings separately in the literature because knowledge management is a new interdisciplinary field and there is no consensus for the discipline completely yet.

Sagsan's (2007) Knowledge Management Life Cycle Model (KMLCM), which should be considered at the intra organizational level, will be tested in the Turkish Petroleum Oil Industry Dealer Firm (TPOIDF) in this study, because the model allow readers to re-conceptualize knowledge activities comprehensively. Also, it could be find out a suitable solution about knowledge process orderly. At this point, the main research questions should be answered, here. *What are the fundamental roots of knowledge management processes that include all the details of knowledge management models? What is the most suitable organizational design and organizational life cycle to implement KMLCM?* In order to determine these activities, we should elaborate the processes of knowledge such as creating, sharing, disseminating, codifying, structuring, auditing, organizing, classifying, recognizing, using, etc. In sum, this study firstly aims at reviewing knowledge management models in the literature and secondly aims at testing Sagsan's (2007) model by focusing on the knowledge processes at the TPOIDF. The firm is suitable for implementing the model for two reasons. First, the firm's middle and top management managers attend knowledge management seminar so, they had an awareness on how knowledge management could be applied in the firm. Second, the firm is at the initial stage about applying KM and they need an extra and specific information to implement KM. For all type of organization, the model offers a solution for a given problem by seperating organizational data,

information and knowledge and moves organizations from information management to knowledge management. It also prepares firms, which are at the initial stage, to implement wisdom management and strategy. It is well known in the literature that information management differs from knowledge management based on k-hierarchy (Sağsan, 2007), so the KMLCM is focused on the k-hierarchy as well.

2. Knowledge management models

In this study the term 'knowledge processes' was used instead of the 'knowledge management model'. So the process of knowledge, which begins with individuals' mind and diffuse via technological and social systems throughout the organizations, was used the study. Different processes contain different knowledge levels or stages that could be summarized below in Table 1.

Table 1: Knowledge processes / models[1]

1	**Awad and Ghaziri (2004)** Capturing, organizing, refining, transferring
2	**Becerra-Fernandez, Gonzalez and Sabherwal (2004)** discovery, capture, sharing, application
3	**O'Dell, Grayson and Essaides (2003)** Organizing, sharing, adapting, using, creating, defining, collecting
4	**Alavi and Leidner (2001)** Creation, storage/retrieval, transfer, application
5	**Dalkir (2005)** Knowledge capture and/or creation, knowledge acquisition and applications, knowledge sharing and dissemination
6	**Sağsan (2006, 2007, 2009)** Knowledge creation, knowledge sharing, knowledge structuring, knowledge using, knowledge auditing
7	**Meyer and Zack (1996)** Acquisition, refinement, store/retrieve, distribution, presentation
8	**Bukowitz and Williams (2000)** Get, use, learn, contribute, assess, build/sustain, divest
9	**McElroy (2003)** Individual and group learning, knowledge claim validation, information acquisition,
10	**Wiig (1993)** Creation, sourcing, compilation, transformation, dissemination, application, value realization
11	**Nickols (1996)** Acquisition, organization, specialization, store/access, retrieve, distribution, conservation, disposal
12	**Rollet (2003)** Planning, creating, integrating, organizing, transferring, maintaining, assessing
13	**Skyrme (1998)** Identify, create, collect/codify, knowledge database, diffuse/use

These models sometimes are evaluated like ideal roadmap for applying knowledge management strategies effectively by considering business process or sometimes are analyzed in terms of knowledge types. The common aspect of all models is focused on the information and knowledge processes, cognitive models, maturity models, technological systems, artificial intelligence models, organizational and individual learning models, etc. For instance, As Abril (2007) discusses that some of the lessons learned were important if the prior knowledge of knowledge practice owners on a given knowledge domain is a requirement to facilitate an attitudinal change. These are (i) action research components were of help harvesting knowledge assets from tacit knowledge, (ii) perceived value moderates the motivation of associates to participate in the knowledge enablement program, and (iii) knowledge practice owners should perform their agentic task as consultants. Chen, Liang and Lin

[1] 7-12 items were adapted from Dalkir's (2005) study, p.27

(2010) propose a model based on the knowledge ecology called DICE. It includes the distribution, interaction, competition, and evolution among different biological species. From this ecological perspective, a model that consists of knowledge distribution, knowledge interaction, knowledge competition and knowledge evolution is proposed.

Goldman (200?) intends to contribute to the understanding of how dynamic capabilities make innovations possible (either technological or organizational changes) by i) highlighting the importance of distinguishing organizational knowledge of first and second order; ii) clarifying the relation between the KM and innovations, especially the organizational changes ones; and iii) showing that organizational knowledge, understood as the producer of capabilities, is an important element of a firm's sustainability. Grant and Grant (2008) propose a model for next generation knowledge management, derived from four stages. First is called "Knowledge as the Domain of Philosophers and Scientists"; second is related to "Precursors to Knowledge as a Management Issue"; third focuses on the "Emergence of Knowledge Management as a Discipline and First Generation KM" and fourth explains the key "Views of the "Next Generation of KM".

Boisot (1987) developed a model that considers knowledge as either codified or uncodified and as difussed or undiffused, within an organization. Skandia (Lank, 1997) called Swedish firm offered a model about measuring its intellectual capital that includes equity, human, customer and innovation in managing the flow of knowledge within and externally across the networks of partners. Demerest's (1997) knowledge management model emphasize on the construction of knowledge within an organization. This construction is not limited to scientific inputs but is seen as including the social construction of knowledge. The model assumes that constructed knowledge is then embodied within the organization, not just through explicit programs but through a process of social interchange (McAdam and McCreedy, 1999; Haslinda and Sarinah, 2009: 191-92). According to Frid (2003), there are five maturity assessment model and knowledge management implementation can be divided into five levels. The five maturity levels are i) knowledge chaotic, ii) knowledge aware, iii) knowledge focused, iv) knowledge managed, and v) knowledge centric. Kogut and Zander(1992, 1993, 1996) assert that knowledge is a source of competitive strategy of the firm. They argue that firms effeciently survive in the competitive advantage based on knowledge processes such as knowledge creation, transfer, capabilities, and transformation. In addition to this, individuals sociality and unsociality have a crucial role for managing knowledge in the firms.

The models, which belong to the information processes are frequently converged on technology and generally called 'knowledge management system' and the knowledge processes require human capacity and refer to the individual, collaborative and social learning systems. Some part of models underline the knowledge role at the individual level, some part of them discuss competitive capacity of knowledge at the organizational level. One of the most important holistic approaches to the knowledge management at the organizational level was created by Sagsan's (2007) study, called 'Knowledge Management Life Cycle Model'. Thus, the model will be tested because of TPOIDF's dual structure that will explain below.

2.1 Sagsan's knowledge management life cycle model

This is an open system model and it is based on the processes of knowledge at the intra organizational level. The model was aligned with the business processes, knowledge types, intra communicational channels, data-information-knowledge repositories, product/service-based processes and intellectual capacity of organizations. Finally, the model could be evaluated holistically and it contains most part of KM imlementations.

There are five main stages to create knowledge intensive organization. When knowledge management processes are deeply analyzed according to Table 1, it is seen that there are certain classifications relating to the stages of knowledge. However, these classifications are presented in a complicated manner in the literature but the content of knowledge management practices can be structured by hierarchically providing five basic processes such as creating, sharing, structuring, using and auditing knowledge.

The first step of KMLCM begins with *knowledge creating* and it requires the types of knowledge. As it is well known in the KM literature, many types of knowledge such as tacit, explicit, audio-visual, textual, graphics, tangible, intangible, codified/uncodified, structured/unstructured, official/unofficial, plays a crucial role to embedded organizational routines. In sum, tacit and explicit forms of knowledge

could be created every organization's routines. Tacit form of knowledge is invisible capacity of organization and needs to be captured from an employee who has huge experiences. The main purpose of knowledge management is to capture individuals' tacit knowledge and gain competitive advantage, especially in the high uncertainty environment. After capturing tacit knowledge, the explicit one emerges naturally and requires structuring in the knowledge repositories. These two types of knowledge are inevitably created by the individuals, groups, teams, departments and organizations as well because of their task structure to perform it professionally. Thus, creating tacit knowledge is a natural process while organization is performing its duties.

The second step of the model is *knowledge sharing* and it inquires the prerequisites of knowledge sharing mechanisms. In order to increase the capacity of knowledge in organizations, the mechanism allow workers, teams, departments and groups to share their tacit and explicit knowledge via technological and social communication infrastructure channels. Social communication means informal working settings and helps especially tacit to tacit knowledge transfer. On the other hand, technological communication infrastructure is useful for structuring and registering data and information as well as transferring knowledge timely and rapidly. Especially new social media strongly supports worker to share their tacit knowledge via technological channel.

Knowledge structuring is the third step of the KMLCM. Knowledge could be visualized via storing and retrieval systems, which are based on the technological aspect of knowledge. This step includes database systems, experts systems, artificial systems, decision support systems, e-mails, yellow pages, shared documents, knowledge visualization software, etc. In essence, data and information systems play important role here to implement knowledge structuring or organizing systems successfully.

Without *using knowledge* in any product or service as well as the work processes in organization, KMLCM could not be accomplished. In order to create a new service or product, organization needs to apply its knowledge repositories after structuring it. Knowledge could be appeared at the third steps of the model, so explicit knowledge leverages employees to integrate it with the product or service cycle. One of the most important things to explain here is that, individuals should transform information into knowledge relies on their experiences. Thus; skills, abilities, creativeness, attitudes are some of the main components that makes workers experiments. Aligning knowledge strategies with organizational working process or routines is another subtitle that takes place in this step.

The last and the five step of the Model is *knowledge auditing*. This step could also be called 'control mechanism of knowledge', which has two subtitles such as knowledge assets auditing and intellectual capital measuring. Knowledge assets are the source of innovation and include organizational archives, databases, patents, trademarks, organizational reputation, know how, etc. Knowledge auditing gives an idea about the past and future knowledge processing capacity of an organization. Thanks to this process, the amount of knowledge to be used in Research/Development activities is determined as well. Besides, knowledge audit demonstrates in what amount of knowledge to be used in determining knowledge-related strategies can provide the organization with competitive advantage to what extent (Tiwana, 2000: 243) and the quantitative ratio of an organization's learning capacity as well as its capacity to put learned knowledge into practice. After determining knowledge assets, organizations need to realize their intellectual capital. Therefore, measuring intellectual capital is another sub-title of the processes.

This model is suggested for filling the gap between the practical and theoretical side of KM. It can be evaluated holistic approach and it challenges to the complex systems as well. The model seems to follow a hierarchical order and the applicability of the model can change by the sectors, the age and size of an organization. While in some organizations, knowledge inflow materializes in a hierarchical order, it circulates randomly in some of them. It differs as to the sector, in which an organization operates or to the internal/external environment, which an organization is connected with. The course of knowledge within knowledge management life cycle could be better explained by the coding on the model given above: After knowledge is created in organizations, it can also be structured without being shared via any communication channel (c1). New knowledge can be used in the goods, services or processes of organization without being shared or structured (c2). Structuring of knowledge before being shared is not essential. After created and shared, knowledge can be used without being structured as well (sh1). Nevertheless, the knowledge sharing can be audited for re-creation before being structured and used (c2). After being shared within the organization, knowledge

can be re-created without being structured, used and audited (c3). The structuring stage follows the creation and sharing processes. The structured knowledge can be re-shared (st1) or re-created without being used or audited (st2). The using, structuring or sharing of knowledge without being audited in the fourth stage of life cycle is possible (u1, u2).

The importance of the aforementioned processes during the knowledge management practice is also in direct proportion to knowledge that comes from environment. For instance, knowledge acquired from internal and external environment of an organization will contribute to the formulation of the strategy for knowledge management practice as well. The knowledge of customer, supplier and particularly rivals is of vital importance for the organization. Therefore, such knowledge should be included in the system during the processes mentioned above.

Figure 1 provides necessary processes for knowledge management along with its sub-titles and analyzes the organizational knowledge management-environment relationship. The information that come from the internal and external environment of an organization could be immediately transformed knowledge through individuals, groupware, communities of practice, social and technological infrastructure, learning capacity, which all gain competitive advantage of an organization to apply KMLCM. Finally the internal and external environmental components make open system to the Model, which gathers data and information from environment and transforms them into knowledge. The Model differs from the others, which were mentioned above, at least three aspects:

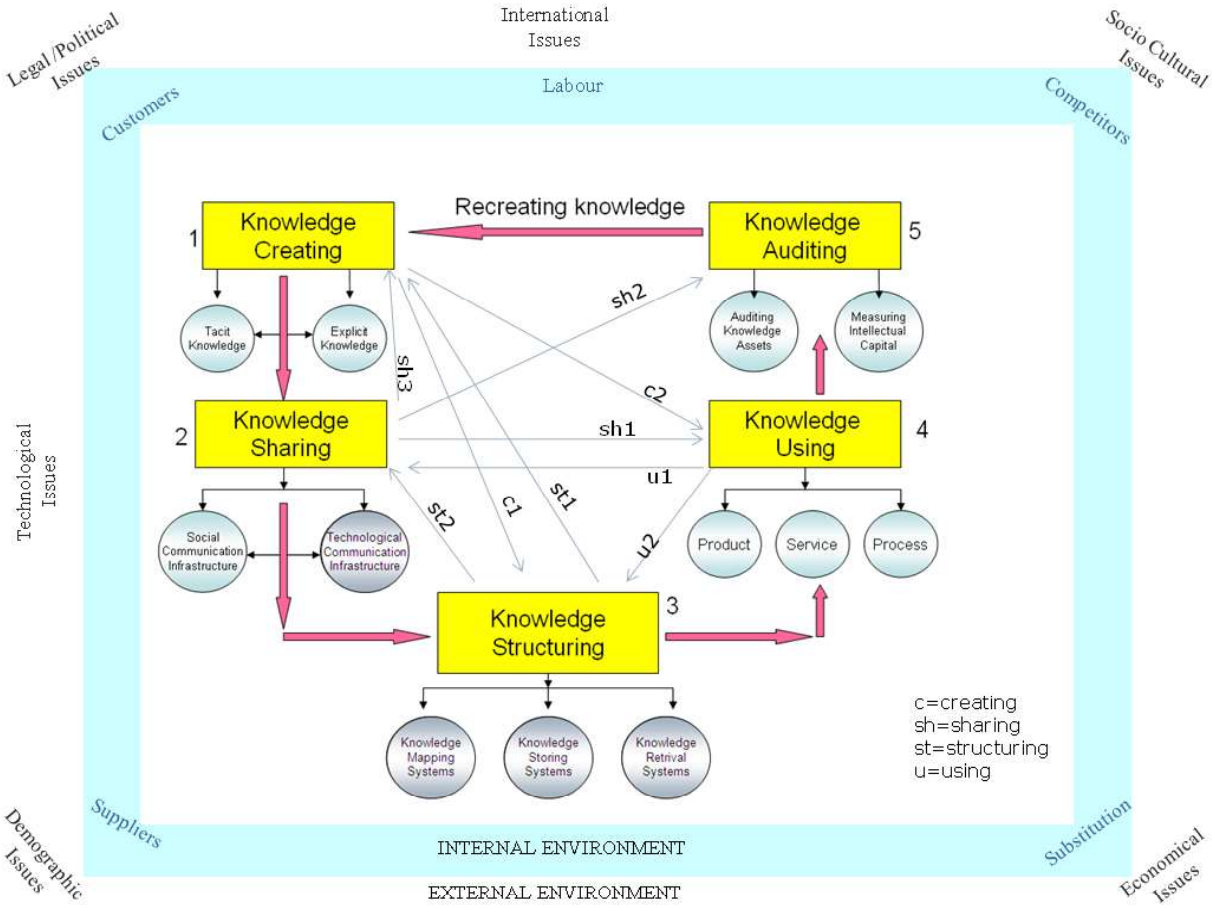

Figure 1: Knowledge management life cycle model

Sagsan, M. (2007). "Knowledge management from practice to discipline: a field study", *AID TODAIE's Review of Public Administration*, 1(4):123-157.

1) KMLCM includes the first generation of knowledge management activities so it provides KM practitioners to understand KM concepts and discipline easily at the interdisciplinary manner. Thus, it is useful for firms which are at the initial stage of imlementing KM strategy because the processes of knowledge in the organization flow hierarchic style.

2) The sub-titles of KMLCM allow KM adopters to follow the flow of information and knowledge detailly at the organizational level, because all sub-titles of the model could be integrated with the business strategy as well. For example, at the end of structuring/organizing knowledge stage, organizational knowledge map occurs based on the business and decision making process of an organization. Moreover, knowledge could be efficiently shared especially through social communication infrastructure channel within the social environment, that should be created in the organization. Also, the model focuses on the types of knowledge: tacit and explicit. Especially model suggets an specific roadmap about how tacit knowledge should be captured in organization. The capacity of intellectual capital and knowledge assets of the organization could be realized through the model as well.

3)The KMLCM could be evaluated like a roadmap for implementing KM strategy step by step by considering the sub-titles. For this reason, knowledge processes flow hierarchically and increase knowledge capacity of usage for organizations' service, product and decision making process. In addition, the model offers vertical hierarchic or organic structure of organization to implement KM effectively instead of mechanic or hierarchic organizational structure.

3. Empirical test based on KMLCM

This theoretical model about applying knowledge management was empirically tested at the TPOIDF. Although the firm, which is a supplier of governmental oil industry in Turkey, operates at the private sector, it also hires from the governmental oil industry. Thus, the firm has a complex structure and represents both public and private sector's organizational structure and culture, so it embodies mechanic and organic structure (Burns and Stalker, 1971). For this reason, the TPOIDF was selected because of their dual structural qualification. In addition, there is top managers' team at the TPOIDF's board of directory and they were working on the public sector in their previous work. As for the KMLCM, it doesn't argue that it should be applied specific sector, so it could be applied any kinds of industry and put forwards a comprehensive knowledge management implementation model that covers all activities of 'knowing organization' (Sağsan and Bingol, 2010) such as tacit to tacit knowledge transfer, informal communities of practice, personalization versus codification strategy and knowledge management lifecycle models. Therefore, the model explicitly could be considered holistically.

3.1 Research methodology

In order to test the KMLCM for an organization, which reflects both organic and mechanic structure, it was searched total public organizations in Turkey which have private sector suppliers from the public servants through snowball techniques. Turkish Petroleum Corporation is suitable for searching because it is one of the most famous and well-known public organization, which have a lot of supplier from the private sector in Turkey. This study includes private sector organization and its nickname is Turkish Petroleum Oil Industry Dealer Firm (TPOIDF). The data were collected via semi-structured form during in-depth interview and action research were used in the study. The discourse analysis technique helps us to analyse data.

3.1.1 General information about TPOIDF

The firm was established in 2006. By considering the most of the oil dealer firms' life cycle in Turkey, it is at the initial stage, so there is no institutionalized structure and standard procedures in the firm. 130 employees are working with 10 different areas such as Ankara, Dörtyol, Kırıkkale, Batman, İzmir, İzmit, İstanbul, M. Ereğlisi, Giresun, and Mersin. Headquarter of the firm is at Ankara, which is the biggest one with regards to size and the number of employees (88 employees are working the Headquarter). The general average of age of the firm is 36 and 87,5% are male and 12,5% are female. The level of education of the firm is moderately high: 19% employees were high school graduate, 9% are vocational high school graduate, 7% are associate degree graduate, 53% are undergraduate, 11% are graduate, and 1% gets doctorate degree. On the other hand, there are 69 employees who work 0-5 years, 15 employees who work 6-10 years and 4 employees who work 11-15 years in the firm. By considering the organizational chart, it can be said that the top management level of the firm includes board of directors, board of supervisors, general manager, consultant, two general manager assistants, legal consultants and secretary of board of directors. There are seven departments in the middle level management and each of them has three sub units.

3.1.2 Research design and data collection

The level of analysis about testing KMLCM covers individuals. Before collecting data, employees were informed about KMLCM and KM terminology. As we mentioned before, the sample size of the research includes only Ankara Headquarter. 21 employees of the 88 were participated in the research. The data was collected via in-service training with semi structured questionnaire form. Employees were informed about the model for 2 hours before in-depth interview and filling the semi-structure form.

The first question is about understanding the capacity of tacit knowledge creating. Thus, we were determined the job titles, job description, and the employment of the firm. The second question is focusing on the job initiatives. This is an important question to understand the employee's knowledge creating, sharing and structuring ability and skills. The third question is about specifying the employee's learning capacity. This question heavily relies on understanding the communication style and collaborative activities among the employees. In order to understand the extra ordinary capacity of the employees, the question is related to the employee's role within the firm's best practices. One of the most important questions about knowledge sharing among members and departments is trying to understand the flow of knowledge within the social communication infrastructure. The last question focuses on the knowledge flow and refers to the technological infrastructure. It indicates the knowledge structuring stage at the KMLCM. After providing the semi-structured form from the employees, it was made in-depth interview with seven persons who worked long term in the firm. The questions were open-ended and based on the steps of KMLCM.

3.1.3 Findings and comments

When the first step of KMLCM is considered, there is no opportunity enough to create new knowledge independently due to the lack of initiatives. So, neither tacit nor explicit knowledge creating could be succeeded freely. Knowledge creating mechanism depends heavily on the standard procedures and norms. Although employees need to share their knowledge at the informal settings, the organizational hierarchy does not allow people to share it. For instance "*.___Sometimes I truly spend a lot of time to reach the top management level*"; "*.___although the firm is new, we have not any initiatives*"; "*.___I really believe that knowledge is rapidly increasing via knowledge sharing mechanism so, I am not hesitate to share my experiences with the right people at the right place especially in the informal settings*"; "*.___I enjoy to share my professional knowledge at the informal settings*". According to these discourses, it could be said that the high formalization degree gives rise to limited knowledge creating in the organization. Conversely, low formalization encourges knowledge creating especially at the informal work environment.

When we consider the second step of KMLCM, it refers to knowledge sharing. In the firm, employees tend to focus on informal setting to share their knowledge as well as trustworthy settings. Also, employees are hesitating to share knowledge due to the regulations. For example, "*.___In our organization, without permitting, we cannot share any information or knowledge with someone, the fundamental principle for knowledge sharing is based on confidentiality*" or "*.___I can only provide knowledge from trustworthy people*"; "*.___I prefer to use verbal communication infrastructure to share my knowledge*"; "*.___I definitely prefer to not transmit any information to the outside of the firm due to the regulation limitations*"; "*.___I like helping my colleagues to increase organizational efficiency*". At this stage, low formalization and high profesionalization and decentralization stimulates kowledge sharing based on the KMLCM.

There are specific discourses about the third, fourth and fifth step of KMLCM, which refers to the technology and knowledge auditing mechanism. Although the firm has a strong technological opportunity, employees have no idea about structuring knowledge, because most of them are new and they have no experiences to perform this task. Thus, the employees need to engage an in-service training program. The discourses about this step can be categorized here: "*.___I use technology with my own interest*"; "*.___I can freely benefit from the technological opportunities relating to my profession*"; "*.___when it is compared another firm, we have a lot of software project*"; "*.___technology is a big advantage for me to perform my task in my organization, unfortunately sometimes it was very hard to do my job*"; "*.___I am keen on learning everything in the context of my job*"; "*.___there is no any limitation to attend in-service training program in our organization*"; "*.___in my opinion, technology is equal to Internet and structuring knowledge is not important, one of the most important knowledge processes is, retrieving knowledge for me*" ; "*.___we are getting external*

service if we have to learn something". In order to organize knowledge, high professionalization could help organization to create knowledge repostories based on technological infrastructure. Unfortunately, learning capacity usage through technology is at the lowest level, so TPOIDF has a diffuculties to transform knowledge into its real performance or work applications.

There is no specific and independent employment policy in the firm because; one of the most subsidiaries of the firm is based on the public organization. So the public sector completely diverse the firm about hiring. These cause inequality about performance appraisal, promotion systems, authority complexity, dissatisfaction on communication, and the lack of motivation and initiatives. It can be said that especially the formal communication emerges at the top management level and the informal one is trasfered at the middle and bottom level of the firm. The employees tend to communicate with the top management at the informal settings. This tendency is very important to create tacit knowledge, however top management doesn't allow personnel to communicate informal manner. In other words, there are some barriers drives from organizational hierarchy. While private sector organization requires informal communication system and organic structure among individuals and departments, the firm could not succeed to overcome hierarchic barriers due to the mechanic structure. Therefore; KMLCM is limited by bureaucracy, the lack initiatives, delegation of authority, hierarchic structure, competency, institutionalized democratic culture, etc. In addition, the lack of top management support is obviously appear by implmenting KM strategy. Thus, the firm should completely provide top management support at the initial stage of the firm.

The findings show us that, there is also no any policy about capturing tacit knowledge. Only data and information are the important for the top management. Therefore, TPOIDF has no opportunity to manage their knowledge, instead of this; there is a limited tendency to manage data and information. For this reason, the firm could not realize the competency of the employees. It is at the initial stage and they immediately need to learn about managing their knowledge based on the KMLCM and to create communities of practice, to visualize knowledge assets, to increase intellectual capital capacity, to leverage innovative activities, and to stimulate collaborative learning and sharing systems. Hence, k-hierarchy has a crucial role for implementing KM strategy for all types of the firms. Before aligning KM strategy with business strategy, the organization has to realize its own data and information processing capacity. If so, they need to determine the level of learning and tranforming capacity such as data, information or knowledge.

4. Conclusion and research for further directions

When the KMLCM is considered regarding to the five steps of knowledge processes, it couldn't be said that five processes flow orderly. Organizational priorities, regulations, size, the degree of formalization, centralization and professionalization are determined the sequence of these processes. The model as a whole is tried to apply for the participants, unfortunately they couldn't realize the detail of knowledge management. The awareness of technological and social settings, which added value to organizations, is perceived by the participants but they do not know how they transform information into knowledge in the working settings.

According to our empirical research, we can evaluate as a pre test for the model. Hence,, explanatory study was used to understand the flow of knowledge in the TPOIDF. Our findings show that especially at the initial stage of the organization, KMLCM has a capacity to extend it to other firms which have dual structure. In addition, the model is suitable for not only to test at the initial stage of the firm, but also could be tested at any stage of organizational life cycle such as deliberate stage, institutionalized stage, innovative stage, rationalized stage, entrepreneurial stage, etc. We strongly believe that KMLCM could be differentiated every stage of organizational life cycle. The model could also be tested different industry with multiple levels of analysis as teams, groups and departments. However, it should be overlooked that the model refers to only the intra organizational knowledge flows.

According to findings, the below questions need to be answered for the future research.

1) In order to implemet KM strategy especially at the initial stage of the firm, action research methodology and in-service training based on KM is suitable for collecting data. Therefore, before applying KM strategy to the firm, we should consider the stage of life cycle. So it is needed to reply the question here. What is the most suitable stage to imlement KM strategy for dual organizational structure?

2) How could be correlated the processes of knowledge and the organizational variables based on KMLCM? Specifically, which stage of KMLCM is directly related to which organizational variables such as formalization, centralization, specialization, professionalization and size?

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