AN ASSESSMENT OF KNOWLEDGE MANAGEMENT MATURITY AMONG THE PUBLIC INSTITUTIONS IN TURKEY

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AN ASSESSMENT OF KNOWLEDGE MANAGEMENT MATURITY AMONG THE PUBLIC INSTITUTIONS IN TURKEY

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ABSTRACT

AN ASSESSMENT OF KNOWLEDGE MANAGEMENT MATURITY AMONG THE PUBLIC INSTITUTIONS IN TURKEY

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Knowledge has been under discussion for many years as its effective management provides considerable advantage to the organizations striving for optimal allocation of resources in this highly competitive world. Assessing organizational maturity to further develop weak points over time in order to achieve the desired state has become important. This is particularly crucial for the public sector as a tool for continuous development, given that they consume considerable amount of public funds. There have been some Knowledge Management Maturity Models (KMMM) developed within the last two decades; however, none of them have gained wide acceptance so far. In this thesis, after studying existing models, two KMMMs have been selected, cultural dimension has been added to achieve a consolidated integrated model. Based on the developed model, a questionnaire has been developed and applied to the executive level decision makers at some selected public agencies managing public funds in Turkey. Finally, the findings of these case studies have been comparatively analyzed.

Keywords: Knowledge management, maturity models, KM and culture, public institutions

ÖZ

TÜRK KAMU KURUMLARINDA BILGI YÖNETİMİ OLGUNLUK MODELİ DEĞERLENDİRİLMESİ

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Rekabetçi dunyada daha fazla kaynak tahsisi için çaba gösteren organizasyonlara önemli bir avantaj sağlayan bilgi yıllarca tartışılagelmiştir. Zaman içinde zayıf noktaları istenen düzeye geliştirmek amacıyla yapılan örgütsel olgunluk değerlendirmesi de önemli hale gelmiştir. Kamu kurumlarına verilen önemli miktardaki kamu fonlarının sürekli gelişen bir araç ile yönlendirilmesi kamu kurumları için özellikle önemlidir. Son 20 yılda birçok Bilgi Yönetimi Olgunluk Modeli (BYOM) geliştirilmiştir ancak günümüze kadar hiçbiri geniş Kabul sağlayamamıştır. Bu tezde varolan modelleri incendikten sonra iki BYOM seçilmiş, seçilen modellere kültürel boyutlar eklenerek bütünleşik modelin daha geniş sonuçlar üretmesi amaçlandı. Modele dayalı olan bir anket ve mülakat geliştirildi ve seçilen bazı kamu kurumlarının kamu parasını yöneten üst düzey karar vericileri uygundı. Son olarak örnek olaylardaki bulgular karşılaştırmalı olarak analiz edildi.

Anahtar kelimeler: Bilgi yönetimi, olgunluk modelleri, BY ve kültür, kamu kurumları

To My Mother Güler

And

My Sister Canan

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LIST OF ABBREVIATIONS

Acronym	Definition
APQC	American Productivity & Quality Center
CIKM	Canadian Institute of Knowledge Management
CIO	Chief Information Officer
CKO	Chief Knowledge Officer
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integrated
CoP	Communities Of Practice
CQN	Corporate Quality Network
DMS	Document management System
DSS	Decision Support Systems
FAQ	Frequently Asked Questions
IC	Intellectual Capital
ICT	Information Communication Technologies
IT	Information Technology
KCA	Knowledge Capability Areas
KD	Knowledge Documents
KFA	Key Foundation Areas
KM	Knowledge Management
KMCA	Knowledge Management Capability Assessment
KMMM	Knowledge Management Maturity Model
KPA	Key Process Areas
LL	Lessons Learned
OECD	Organization for Economic Co-operation and Development
PDI	Power Distance
R&D	Research and Development
ROI	Return of Investment
SEI	Software Engineering Institute
SGKM	Second Generation Knowledge Management
SPICE	Software Process Improvement and Capability Determination
TOKM	The Old Knowledge Management
UAC	Uncertainty avoidance

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Knowledge has been under discussion for many years as being able to formally manage it provides considerable advantage to the organizations striving for allocation of more resources in this highly competitive world. Assessing organizational maturity to further develop weak points over time in order to achieve the desired state has become important. This is particularly crucial for the public sector as a tool for continuous development, given that they consume considerable amount of public funds.

Today's organizations have to manage knowledge effectively to sustain competitive advantage (Drucker P. , 2001). However, knowledge assets and sharing activities are not measurable. To measure the organization's knowledge maturity, some Knowledge Management Maturity Models (KMMMs) have been developed to measure and assesses the organization's current level of knowledge management.

According to De Long, organizational culture can improve or impede knowledge management activities (De Long & Fahey, 2000). Hence, while creating a new model related to knowledge, culture must not be ignored.

1.2. Purpose and Significance of the Study

The purpose of the study is threefold: (1) to develop a combined model based on literature to measure the knowledge management maturity (2) to identify organizational deficiencies and recommend means to improve knowledge management (3) to extend existing KMMMs by adding factors related to organizational culture, validating the proposed KMMM.

The aim of this thesis is to develop a KMMM which can be applied in any public institution regardless of the sector. The reason why this thesis has developed this KMMM is to improve the decision-making mechanisms within the institutions so that they are wiser and more methodological and to make the use of resources more economical, efficient and effective. Moreover, the thesis has aimed to find out what qualities these public institutions lack and at which stage or point they are in knowledge management.

The another aim of this thesis is to extend the existing Morphological Analysis of Kuriakose (Kuriakose, Raj, Murty, & Swaminathan, 2011) in order to facilitate selection process of maturity models.

1.3. Thesis Organization

In Chapter 2, the knowledge management literature and existing maturity models are reviewed. In Chapter KMMM's are investigated and the rationale to select the model(s) is presented. Then the combined model is developed. In Chapter 4, the research methodologies to measure the combined model are developed. In Chapter 5, the model is applied in four public institutions in Turkey and the results are presented. In the last chapter of thesis, the study is summarized, limitations are presented and the suggestions for future works are listed.

CHAPTER TWO:

KNOWLEDGE, KNOWLEDGE MANAGEMENT AND KNOWLEDGE MANAGEMENT MATURITY

2. 1. Introduction

Due to the high importance of use of knowledge in social and economic activities, a knowledge based economy shapes the enterprise's operations (Prichard, 2000). "Hence, managing knowledge is one of the most significant challenges that organizations deal with and it gains more and more importance in today's knowledge economy" (Dalkir, 2005). Dalkir (2005) defines knowledge as "a valuable commodity" embedded in mostly in high-technology products which also exists in the tacit knowledge of employees who are quite versatile. Moreover, he puts forward some other properties of knowledge which are related to its use, transfer, ability to use it. In addition, he states that at the end of the day not much remains within an organization in terms of knowledge.

2. 2. The Definition of Knowledge Management (KM)

According to Prichard, Knowledge Management has many aspects and a standardized definition cannot be modeled (Mertins, Heisig, & Vorbeck, 2003). These aspects and the perception of these aspects shape the frame of each definition. For instance, Davenport and Prusak point out that Knowledge Management involves both documented and subjected knowledge and they explain the process of management of knowledge as identification, sharing and creation of knowledge (T. H. Davenport, 1998). On the other hand, Earl sees knowledge as a critical resource rather than land, machines or capital and so it is also critical to manage this resource by creating and sharing it, as Davenport and Prusak state, but he also adds the terms of providing, using and protecting it (Earl, 2001). As another definition, Rothberg, Helen N. and Ericson treat knowledge as an asset of the organization and define Knowledge Management as "the process of codifying, collecting, and disseminating the firm's knowledge assets" (Rothberg, N. Helen, Ericson, & Scott, 2005).

2. 3. The Concepts of Knowledge Management

While investigating the nature of knowledge, according to the hierarchy created by the researchers of Knowledge Management, data scores the lowest point while knowledge takes the highest (Fuller, 2002). For this hierarchy, April and Ahmadi-Izadi, firstly, specify the differences between data, information and knowledge. According to the authors, each of these three elements has unique values and thus they require separate investment and resources. For example, they argue that in terms of data and information, technology has an important role in Knowledge Management progress. On the other hand, knowledge is more about human activities (April & Ahmadi-İzadi, 2004). As a result, it is possible to investigate Knowledge Management under the concepts of data, information, knowledge and the different kinds of knowledge.

2. 3. 1. Data

English dictionaries such as the Merriam Webster and the Oxford Dictionary define data as factual information (measurements or statistics) used as a basis for reasoning, discussion, or calculation. Accordingly, Davenport and Prusak (1998) define data as discrete and objective facts, and for organizations they define data as 'structured records and transactions'. They argue that "data is important to organizations largely, of course, because it is essential raw material for the creation of information" (Davenport & Prusak, 1998). Furthermore, Peter F. Drucker points out that information is data supported with pertinence and aim. As a result, transforming data into information necessitates knowledge (Drucker P. F., 2006). Similarly, Meadow (2000:35) claims that data is a "string of elementary symbols, such as digits or letters" (Meadow, Boyce, & Kraft, 2000).

On the other hand, April & Ahmadi-Izadi (2004:3) view data from a different point of view and underline that although the observation, measurement and/or calculation of data can be made without any human interpretation by today's technology, it is always possible to manipulate data without anyone noticing it. Since data is one of the most important elements used while reaching information by using knowledge, it can limit the quality of information as well as the quality of reaching that. (April & Ahmadi-İzadi, 2004)

2. 3. 2. Information

As mentioned in data concept and as Drucker defined (1988:46) "information is data that has been altered, modified, contextualized, categorized, calculated and condensed" (Drucker P. 1988). This definition is accepted by most of the researchers. For example, for Wiig, data is the collection of facts and information which are organized and specialized and interpreted for a particular situation (Wiig K. M., 1999). Similarly, Meadow (2000: 35) supports that information "has no universally

accepted meaning, but generally it carries the connotation of evaluated, validated or useful data" (Meadow, Boyce, & Kraft, 2000).

From a different perspective, Barclay and Murray (2000) handle information in terms of not interpreted data, but an important tool of knowledge. They choose two definitions of knowledge and search Knowledge Management considering those definitions. According to them there are two definitions of interest. The first one is related to a defined body of information, which might consist of facts, opinions, ideas, theories, principles, and models (or other frameworks). Obviously it is possible to list other categories one of which is subject matter such as chemistry, mathematics, etc.) . The second definition is that knowledge is a person's different states of being with some body of information which include but are not limited to ignorance, awareness, familiarity, understanding, facility. (Barclay & Murray, 2000). Hence, in both definitions, they take information as a way of reaching knowledge.

2. 3. 3. Knowledge

As it is explained in the information concept, information is analyzed, interpreted, categorized, calculated and accordingly altered data; hence, it has substance, yet the meaning of information can be deduced by internalization and contextualization of it by an individual. Moreover, for information to be a tool for knowledge as the definitions of Barclay and Murray describe, it has to get that meaning (Skyrme D. J., 1999). Skyrme argues that since meaning is attribution of an individual, knowledge is subjective and abstract. According to him, just like information is the interpretation of data, knowledge is the interpretation of the information by adding discussion, understanding, ordering by an individual. Consequently, knowledge is more value added compared to the information, since it includes beliefs, viewpoints, precept, methodologies, expectations etc. (Nickols, 2012).

As Fuller points out, knowledge is the mind's presentment and is the result of the mind's perceptiveness to what lies outside it (Fuller, 2002:16) . It is, therefore, the whole body of experiences and skills that individuals use for interpreting information and getting answers to questions and it is always about the people themselves (April & Ahmadi-Izadi, 2004:8) .

Peter Senge further asserts that knowledge is "the capacity for effective action" (Senge, 1990). As a result, to make key decisions or to act, knowledge is required as the processed information.

2. 3. 4. Types of Knowledge

In the 1990's, Nonaka came up with the two types of knowledge which are explicit and tacit (Nonaka & Takeuchi, 1995). Additionally, Botha expresses that tacit and

explicit knowledge should be treated as a spectrum rather than as definitive points (Botha, Kourie, & Snyman, 2008).

2. 3. 4. 1. Explicit Knowledge

Explicit knowledge is formalized and inscribed knowledge, and as mentioned by Brown and Duguid, it is sometimes referred to as know-what (Brown & Duguid, 1998). Hence, identifying, storing and regenerating the knowledge are not difficult and they can easily be manipulated by information technologies (Wellman, 2009). Furthermore explicit knowledge can be obtained or formally delivered either in physical or electronic formats (Swan, Robertson, & Newell, 2002). Hence, this kind of knowledge can be transferred, shared and communicated easily. Moreover it is portable and easy to access through books, manuals and other coded or recorded formats. Due to all of these features, explicit knowledge can be regarded as tested and proven knowledge. However, although it is reliable knowledge, from a different point of view, many researchers such as Brown and Duguid, Bukowitz and Williams etc. treat explicit knowledge as less significant since the amount of experience in that kind of knowledge is not enough to reach know-how to help individual to get a competitive advantage. As a result, these theoreticians regard explicit knowledge as information leaving out little differences. This causes Knowledge Management studies which are related with technology to get support from this kind of knowledge. Hence many products and systems on Knowledge Management have been designed within the limits of information or, as Botha identificates of explicit knowledge management software (Botha et al. 2008) .

2. 3. 4. 2. Tacit Knowledge

Tacit Knowledge, which is originally defined by Polanyi in 1966, is referred to as know-how as Brown and Duguid (1988) point out. Despite the fact that it cannot easily be explained or described, Tacit Knowledge is regarded as the fundamental type of knowledge in building organizational knowledge (Nonaka & Takeuchi, 1995). As Nonaka emphasizes, this kind of knowledge includes more intuition of the individual which are mostly related with the experiences of the individual. For the advancements within the organization, Tacit Knowledge is considered to be the most valuable source of the knowledge. (Wellman, 2009). Therefore, Gamble & Blackwell relate the lack of focus on tacit knowledge directly to the decreased ability for innovation and prolonged competitiveness (Gamble & Blackwell, 2001).

“Tacit knowledge is found in the minds of human stakeholders. It includes cultural beliefs, values, attitudes, mental models, etc. as well as skills, capabilities and expertise” (Botha et al 2008). Hence, tacit knowledge is personal and it originates in the ' know how' usually displayed in the form of skills, special qualifications and talents (Little, Quintas, & Ray, 2002).

How to leverage and capture tacit knowledge is a significant component of Knowledge Management for individuals in an organization to be capable of getting benefit from ‘know-how’. Wellman (2009) suggests natural, informal and friendly

environments which let individuals be in social interactions for the transfer of this type of knowledge. The theories about the effect of social interaction on transferring tacit knowledge and getting explicit knowledge by externalization of that kind of knowledge are improved by Nonaka and Takeuchi (1995). They also have drawn attention to the value of those theories for organizations.

2. 4. KM in the Knowledge Economy

The relation between business environment and Knowledge Management has been a recent interest, whereas knowledge related activities and research have been investigated by scholars for centuries. Today's 'knowledge economies' are witnessing the appearance of new paradigms for innovation and the improvement of knowledge related to economic production. (OECD, Innovation in the Knowledge Economy, 2004) According to them, the reason of this view in not related to the term of knowledge, and innovation is now seen as the essential ingredient of economic growth. Due to the growing importance of knowledge, the requirement of an advanced definition of drivers, components and instruments of knowledge cause Knowledge Economy to be related with Knowledge Management (OECD, Innovation in the Knowledge Economy, 2004)

By most sectors and industries in the knowledge economy, innovation is seen to be one of the most important sources of economic development, efficient competition and rotation of society (Abell, 2001). This effect in knowledge economy is called "Schumpeterian renaissance" by OECD. For this reason, in the business environment, the investment amount in innovation has increased and the evidence for that is not only the requested and approved patent numbers (OECD, 2004) , but also the augmentation of new varieties of goods and services which are the products of "mass customization" shaped by trend (David P. A., 1999), Practice-based learning environments start to expand from such situations in which fordist divisions of labor in offices and factories decreased the individual's range of activities, which, in turn, affected the opportunity to learn. This, as a result, gives rise to more and more possibilities for knowledge creation.(OECD, 2004) .

Searching the root of this emerged relation between Knowledge Management and Knowledge Economy, the world economic environment has been affected by the revolution occurred with the birth of limitless liberalization, new emerging markets, capitalism and the knowledge economy (Abell, 2001) . "All these have been caused by globalization. Globalization is considered to be the way of developing interdependence and interconnections between nations" (David P. A., 1999).

The technologies of computers and telecommunications have mapped together under the name of Information Communication Technologies (ICTs) . This new birth of ICTs has been a significant breakthrough in the creation and consolidation of globalization (Guthrie, 2003). For example, individuals can now travel to several places in one day, with improved means of transportation thanks to the contributions of ICTs. Furthermore, telematics, teleconferencing, videoconferencing technologies and information flows now allow people to exercise control and interact with the people in other countries or places without themselves physically being there. About

these improvements, Little et al. points out that although physical borders or boundaries exist, this is not a limitation, disruption or interference for the flow of ideas, objects and people (Little, Quintas, & Ray, 2002).

Abell defines this new business culture as the culture with no limitation of time and distance. Time limitation which has affected development negatively has mostly been overcome and to the same degree, time cost has been managed by the distance covered (Abell, 2001). The situation of world witnessing on immense mobility of ideas, objects and people has given rise to a number of inter-organizational/intra-organizational, and global investments (Abell, 2001).

In the meantime, since innovation takes place the requirement of for it grows thus it succeeds in highly competitive and globalized economies. However, it is not easy to differentiate between certain originalities and innovations that are new only to the companies that accept them, or more complex versions of already existing products or ideas to a new market. The fact is that companies and society spend more time and energy to produce and conform to the change (OECD, 2004). Through knowledge networking, new markets are being discovered and explored. The knowledge economy highlights the importance of knowledge and the fact that it should be considered to be a critical factor for quality production and service delivery i. e. business entrepreneurs create and use knowledge to improve on, or to create new goods and services (Dunning, 2000).

2. 5. KM and Public Sector

Governments and public organizations generally adopt management reforms not as early as the private sector mainly because of civil service rules, structure of the institutions and the difficulty of implementing public processes complicate management changes (OECD, 2003).

According to Wiig, the KM targets for public administration in a democracy may be listed as the intent to enable that (Wiig, 2002) :

- The services that are placed in the public agenda must be performed effectively and in a timely manner by consuming minimal resources so that public administration does not face unexpected challenges and disasters.
- Public administration should provide stable, just, secure and orderly services.
- Public administration should provide an adequate level of quality of life by building, maintaining and leveraging commercial and public intellectual capital.
- A successful community develops its people to become qualified knowledge workers and its institutions to be competitive.

Public sector and private sector differ in many aspects. OECD (2003) report describes these differences:

- Private sector organizations feel the pressure of competitiveness and the incentives to lower costs but public sector organizations traditionally give less importance to it although this pressure is increasing with time.
- Public sector organizations have more vertical hierarchy and fewer incentives for team work and innovation.
- Public sector outcomes are less measurable and less clear.
- Public sector organizations are more knowledge-intensive whereas private sector acts knowledge as competitive advantage. Public sector adopts openness because of public interest and it is possible to reach a large amount of data.
- Retirement of experienced civil servants and transfer of knowledge workers affect public organizations negatively because of losing intangible capital and organizational memory. (OECD, 2003)

2. 6. The Use and Application of Knowledge in Business

2. 6. 1. Knowledge Application and The Business Environment

The activities of the organizations are highly influenced by both controllable and uncontrollable factors (Wellman, 2009). The business environment involves all those factors that can impact the organization's establishment, growth and survival, positively and /or negatively. Hence, it supports or blocks the organization's future goals and objectives. The entrepreneur needs to be conscious about the occasions in the affinity of the business environment since these occasions can provide opportunities for, or cause threats in the organization (Baldwin & Clark, 1997). The prediction of the impacts of those factors is not possible in business environments as the factors that are substantive may be extraneous in time (Krüger, 2008). Therefore, for the creation of wealth in the business environment, organizations should create new knowledge, too.

However, it is important to be aware of the distinction about the environment as internal and external environment (House & Hill, 2005). The organization itself is called the internal environment, which is defined as the organization's micro environment by House and Hill. On the other hand, the external environment is the part of the business environment outside the organization and it mainly includes the market and the macro environments. In order to be able to respond to the external environment, both the micro and macro environments should be taken into consideration in conjunction (Baldwin & Clark, 1997).

The Micro environment has three major elements: The first one is the mission and objectives of the organization, the second one is the functions of the organization and the third of them is the production factors. These three elements are mutually complementary elements and should be treated as a body of knowledge for the perfect functionality (Baldwin & Clark, 1997).

The organization and the market together constitute the macro environment of an organization and include the uncontrollable events and factors (Baldwin & Clark, 1997). The most powerful forces in the macro environment include economic conditions, technological changes, social and cultural forces of the market. There is a need to constantly know what constitutes the market and where the market is situated. The above business environments that have been described determine the knowledge that the organization needs, creates, uses, and further investigates the depth of a KM strategy and the speed of KM implementation to ensure that the organization not only survives, but also gains a competitive edge.

2. 6. 2. The Economic and Political Nature of Knowledge

According to Guthrie, besides the success of an organization, knowledge is also a vital component which determines the international political and economic standing of the country in which it operates (Guthrie, 2003). Lyotard defines knowledge and power as the "two sides of the same question" (Lyotard, 1984). Political and economic decisions may, for instance, result in policy formulation and the establishments of an ICT infrastructure that highly determine the cost of knowledge creation and its transfer. This situation may result in a costly knowledge creation and people and organizations may be encumbered from accessing it. In the ICT age, knowledge creation and dissemination is now more than ever influenced by political factors. In a similar way, economic factors have a considerable impact on knowledge exchange, i.e. knowledge is now being produced in order to be sold, or it becomes a significant cost item in production (Abell, 2001).

2. 7. KM Strategy, Processes and Systems

The adaptation of a good KM strategy, system and process provide business environment with success of KM.

2. 7. 1. KM Strategy

Just as what the nervous system of a human body is, strategy is what constitutes as the plan of an organization. KM processes and systems are managed by strategy. Time, human and financial resources meet future demands and challenges. As Earl, (2001) points out, entire organizations are altered and delivered, developed. That is, KM strategy makes the plan and the process of KM and directs the design of KM systems. According to House and Hill, a knowledge strategy is a devoted instrument used by business managers so that management team can plan, implement and control management actions about business-relevant knowledge (House & Hill, 2005). Some KM advisors see KM strategy as a dichotomy. Organizations need to exactly decide to focus codification or the personalization of knowledge like 80% codification and 20% personalization or vice versa. However, Koenig does not agree with this idea, and he argues that a KM strategy should always be supported with the business operations, aims and objectives of the organization (Koenig & Srikantaiah,

2004). There should be a harmony within the business. He suggests that when the organizations products are categorized and people reliance on explicit knowledge mature, codification can be the KM strategy. On the other hand, personalization can be the KM strategy if the organization's products are innovative and customized. In order to set up influential KM strategies, organizations wish to survive in the current knowledge economy. Such strategies depend on the organization's structure process, system, and management and worker behavior. Koenig and Srikantaiah (2004) suggest that unless organization learning exists, strategy will not be complete. Skyme further offers that a KM strategy should be included in employee and customer requirements, process, relationships products and services.

Knowledge creation and knowledge learning: In order to improve competitiveness, the organization always ought to motivate its employees to innovate and learn from old experiences and obtain new and better knowledge (Abell, 2001:12-13). Besides, the organizations had better guarantee that the organizations consider both external and internal learning. While in internal learning, members of the organization produce and partake new knowledge within its limits, in external learning boundary spanners get knowledge from an outer source. However, there should be more emphasis on internal learning and external learning is also necessary for the organization (Guthrie, 2003).

Knowledge transfer: The systematic transfer of knowledge should be ensured by the organization across the other organizations. This is because the new knowledge becomes part of the organization's work culture (Dalkir, 2005).

Personal knowledge: Every employee should be encouraged to be responsible for improving KM. Individuals ought to have desire to broaden their knowledge base.

Organizational repositories: Skyrme refers to the "organizational memory" which includes records, files, the heads of the organization's people and in external sources (Skyrme, 1999: 46, 54,202; Abell, 2001:30-33; 50-51). In order to be captured and entered into a knowledge data bates or storage with meta-data appended, Organizations need the number of resources required. Organizational Memory is the best way to focus on specific areas of knowledge.

Knowledge of products, and services: Organizations produce and accumulate extra knowledge which includes market development, problem-solving and product development and testing. Such resources are generated from market research, user interviews, prototype results, application experience, problem solutions, user observation etc. This knowledge should be saved in storages and used for new product development, user guides and procedure manuals (Skyrme, 1999:53-54).

Knowledge of processes: Each business process includes embedded knowledge and activities which should be codified and captured as routine process (Skyrme,1999:55-56; Abell, 2001:25-26).

Customer knowledge: Customer knowledge is the most important knowledge in organizations. The organization should always improve customer satisfaction. According to Skyrme, many organizations focus more on the manufacturing of the product than their customer's needs. This should be reversed. Good customer

knowledge should build close working relationships with the customers in order that knowledge about how and which products and services are used can be achieved (Little et al, 2002:126-128).

Knowledge relating to relationships: Establishing relationships with stakeholders such as customers, suppliers, and business partner is the significant source of knowledge. Organizations ought to help relationships by providing their employees with mobile phones, e-mail, Facebook, tele /video conferencing and fax facilities to communicate and interact for business purposes. Chatting with each other should be encouraged in business environment (Baldwin & Clark, 1997).

2. 7. 2. KM Processes

It is mentioned previously that KM processes would relate to developing new knowledge, combining like knowledge with already existing knowledge, valuing knowledge, sharing and using it.

Nonaka and Takeuchi's differentiation between tacit and explicit knowledge develop interrelation between these concepts by referring to the knowledge creation spiral. Four levels of knowledge carriers exist in organizations; these are the individual, groups, organizational and inter-organizational carriers. The spiral model refers to a dynamic process where explicit and tacit knowledge exist. *Externalization* transform tacit knowledge into explicit knowledge, *Combination* merges existing explicit knowledge to be combined in order to create new explicit knowledge. *Socialization* is a process that transfers tacit knowledge one person to another. *Internalization* is a process that converts explicit knowledge to tacit knowledge (e.g. learning, training).

Firestone examines KM processes under 'the old Knowledge Management (TOKM) 'and 'Second Generation Knowledge Management (SGKM)' paradigms. According to him, TOKM is the existing knowledge which helps the decision-making process. In this process, Firestone defines the knowledge as an issue of intellectual capital and when people leave the office, the organization loses most of its knowledge. SGKM is comprehended from the TOKM and in this process knowledge is not only existing but also built by people constantly. Also generated knowledge is used to change the organization. In other words, KM is not just a sequential process where knowledge is captured, codified, shared, and distributed. (Firestone, 2003).

2. 7. 3. KM and ICT Systems

Brooking suggests that ICT applications offer employees more influential connection with each other in the business environment. They share expertise and experiences and they connect to the organizational memory (Brooking, 1999: 125-126). ICT can be used to guarantee knowledge processes. Debowski argues whether a well-planned and relevant ICT system can help employees to contribute to KM or not (Debowski, 2006). Additionally according to Ellis, incorporating ICT in KM is a revolutionary reduction of cost and time. Similarly, only a well-designed ICT platform can provide

knowledge capturing and exchange to emerge freely and openly across the many various stakeholders in organization (Gamble & Blackwell, 2001: 168). Good knowledge practices reach an effective ICT platform and employees can more easily seek, acquire or shake knowledge from the many sources that are available (Debowski, 2006:141). Bailey and Pearson have underlined "Information Timeliness" and defined it as the availability of the output information at a suitable time for its use (Bailey & Pearson, 1983). However, Cavaleri & Seivert (2005:262) warn that to ensure the effective application of ICT, sound system policies should be developed. The researchers also argue that particularly in small organizations, KM can be built up and practiced without having access to a formal ICT platform.

2. 8. Organizational learning and Culture

2. 8. 1. Organizational Learning

Drucker defines the dimensions of knowledge as a three tasks list that has equal importance yet different. These three tasks can be faced by the management of every organization. These are:

- To explain the specific intention and mission of the institution, e.g. business enterprise, public institution, or school.
- To make work productive and the worker achieving.
- To control and manage social impacts and social responsibilities.

Also Drucker claims that none of institutions exists by itself and as an end in itself. Every employee of the organization is a part of company and exists for the sake of society. "Free enterprise" cannot be justified as being good for business. "It can only be justified as being good for society" (Drucker P. F., 2006).

According to Prichard, practices which constitute the organization's theory of action include an organization's norms, strategies and assumptions (Prichard, 2000). Each activity and program area symbolizes the organization's own theory of action. The organization's theory of action is not always taken by noting via official documents, though. It is always indicated in corporate documents like organization charts, policy statements and job descriptions. That is, essential norms, strategies, and assumptions of an organization do not change constantly (Wallace, 2007, s. 81). Every employee constitutes their own representation, or image, of the of the organization's "theory of action". While employees' views are not always complete, they would continuously reinforce the situation and alter their picture of the organization. Thus, their abilities such as the organization's knowledge of their own theory-in-use are developed and then their organizational occurs gradually (Wallace, 2007).

Organizational learning is very significant in any business, and managers should create a facilitating environment. Authorities suggest that only organizations that offer a learning and knowledge centered will able to react efficiently, and then managers can follow changes in the business environment. Organizations will lose their market prestige provided that organizations and managers are not able to

improve their "learning power" or cannot use resources to transform business processes based on what is learnt (Dalkir, 2005). That is, organizations and managers who have insufficient "learning power" would not be able to adapt rapidly to what happens in the world.

The central task related with KM is to better cultivate nurture and exploit knowledge at individual and group levels through organizational learning. Organizational learning also develops an organizational culture. Learning improves thanks to time and real life context. Real life context necessitates learning not only in the classroom but also throughout training sessions. When compared to "training", episodic is irrelevant to context of the workplace (April & Ahmadi-İzadi, 2004, s. 18-19). Therefore, workplace is very important for an employee. According to Ellis, conventional learning model is different from others. Expansion of the knowledge economy and enhancements continue twenty-four hours, seven days a week. In other words, keeping the same balance of industry developments necessitate full-time job in some sectors (Abell, 2001). Not only setting knowledge of some sectors is perceived to be a key resource but also it is recognized through on-going learning. Organizational learning has chance to adapt changes in business environment and experiences moves forward by improving new knowledge, skills or behaviors.

2. 8. 2. Networking and Collaboration

Organizations had better provide the environment with natural flow and sharing of knowledge. The idea of networking has become the basic feature of modern business organizations by replacing hierarchies (Skyrme D. J., 1999, s. 15). Hierarchically structured business organizations only trust vertical and especially top-down communication in contrast to other networking which is about connectivity within and outside the organization. Moreover, structured business organizations do not promote both knowledge sharing and encourage innovation (Botha, Kourie, & Snyman, 2008). Many interpersonal communication barriers and bureaucratic tendencies can be decreased thanks to this kind of sharing which can be formal or informal among people. Owing to networking which shares legal or illegal knowledge like an environment, employees are able to communicate with each other freely and they can share what they know with others. According to Skyrme, corporate intelligence has been improved by Networking. This is because it urges about new idea creation and its rapid distribution across the organization (Skyrme D. J., 1999).

In KM, a specific form of networking and collaboration platform has developed thanks to the process which is known as "Communities Of Practice" (CoPs). People who interact with this process provides the other interested parties with sharing on a regular basis information (Little et al, 2002:25-26). According to Little et al, (2002:353), a great number of forms such as virtual teams, virtual organizations, virtual communities, knowledge collaborators and teleworkers include CoPs. Virtual organizations have become one step ahead from traditional organizational boundaries (David P. D., 1994). CoPs pioneer innovations. They pioneer to alter and help with developing corporate intelligence (Abell, 2001:56-58). Lots of devices which include the use of faxes, email discussion lists, the Internet, the organization 's intranet, newsgroup, social media, teleconferencing and Group Ware systems can be used to

facilitate Networking.

Allee examines the importance of CoPs on the subject of those dimensions as for the business, for the community and for the individual. For business, he claims that CoPs help to achieve strategy, make up more competence, aim to solve faster complex problems organization-wide, provides developing talents. For the community, he asserted that CoPs aim to keep knowledge in minds of employees, facilitates reaching to expert people across the organization, assist to build a common language and share knowledge in the organization. For the individual, he claims that CoPs assist employees to do their jobs, encourage a learning-centered sense of identity, help increase individual skills, increase communication with other employees and provide possibilities to contribute to the organization (Allee, 2000)

2. 8. 3. Organizational Culture

Organizational culture is defined by Brooking as "the way we do things around here". According to observers, culture is invisible but powerful since it has the capability of identifying the context within a business. Culture is sincere, encouraging and welcoming across the values of business; thus, this features assist employees to understand how they feel regarding deadlines, quality, unhappy customers and so on, and it includes such activities as ceremonies, measures of success corporate beliefs and values (Brooking, 1999). The organizational culture affects internal business processes, employees' relationships and external relationships. Organizational culture establishes the work mood and immediate environment of an organization. If a knowledge culture is built in a workplace, employees feel comfortable across the immediate environment. According to culture, employees start to think, feel relaxed, behave and talk with each other. The organizational culture leads to successful business or being loser. This is because a new knowledge is shaped stored, developed and distributed throughout the organization and then employees become part of the knowledge base of the organization (Botha, Kourie, & Snyman, 2008).

De Long and Fehey have diagnosed the obstacles of culture facts to knowledge management. According to them, norms, values and practices create behaviors and directly affect organizational culture (De Long & Fehey, 2000). Behaviors create knowledge processes which are knowledge creation, knowledge sharing and use. In this concept authors produce four frameworks that link culture and knowledge According to them culture, shapes beliefs to which knowledge is critical, arbitrates the affiliations between levels of knowledge, generates a context for social communication and builds creation and approval of new knowledge (De Long & Fahey, 2000).

However, Hofstede's research shows that organizational cultures differentiate from each other at the level of practices. These are more frivolous and more easily learned and unlearned than the values which build the bases of national cultures. Consequently, the Hofstede dimensions of national cultures cannot be exploited by comparing the cultures of organizations within the same country. The two models describe different layers of reality (Hofstede & Hofstede, Cultures and Organizations: Software of the Mind., 2010).

Hofstede's "Cultural Dimensions" will be examined in Chapter 3

It is clear that, as mentioned above, the concepts of organizational learning and culture together with networking have the chance to increase business competiveness and evolution. It is because business sector is changed continuously. Therefore, the organization needs to learn, innovate and adapt.

2. 9. Leadership, Management Techniques and People Skills

2. 9. 1. Knowledge Leadership and the Roles of Knowledge

According to Caveri Seivart, employees should have strong and focused leadership skills for an organization to have a strong strategic value. As a result, with that skill of leadership, employees can shape these organizations' values in a strategic way (Cavaleri & Seivart, 2005). Thanks to organization's strategic values and its organizational culture, leaders are identified as productive among the employees of the organization (Glickman, Gordom, & Ross-Gordon, 2001). The development of values is reflected in the way that employees communicate and work. There are significant factors in modern organizations such as collaboration, influential communication, flexibility, adaptability, team work, facility orientation and a focus on quality. Leaders had better determine the organizations' future knowledge requirements. Besides, they must determine who shall be responsible for generating assets such as knowledge assets. Cavaleri and Seivert argue how much leaders use both "science and art" to develop and improve the practical knowledge. Thus, they invest by using science and art knowledge in the future to create knowledge-based organizations (Cavaleri & Seivert, 2005:4). Liebowitz citing from Wiig in 1966 said, quality professional needs to be developed (Liebowitz, 1999). As Liebowitz put forward, team work, a mix of skills and experience, a new approach to organization improvement and a new focus on the management of people are of utmost importance within an organization (Liebowitz,1999: 4-3) . That is, there is a need to be people-centered because people hold the much needed knowledge. The leadership should be able to identify and order especially individuals to be responsible for KM and the guide of other (Earl, 2001).

In knowledge intense environment, organizations define different roles and positions. The two of executive roles are highlighted for KM: Chief Information Officer (CIO) and Chief Knowledge Officer (CKO). The CIO has an information technology (IT) background and controls an organization's technology and IT interdepartmental manager communications. The CIO's another responsibility is strategy formulation and to facilitate improvement within the organization. (Janssen, 2011). CKO is a corporate title for a professional within an organization who oversees its knowledge management. According to Skyrme, the role of CKO must include:

- *Developing an overall framework that guides knowledge management*
- *Actively promoting the knowledge agenda within and beyond the company*
- *Overseeing the development of the knowledge infrastructure - 'hard' and 'soft'*
- *Facilitating connections, coordination and communications* (Skyrme D. ,

1999)

2. 9. 2. Intellectual Capital in a Knowledge Driven Organization

According to Teece (Teece, 2000), Intellectual capital (IC) provides innovation and competitive advantage in contemporary economies that are based on knowledge (Teece, 2000). Also, Marr at al. suggest that, knowledge management (KM) is admitted as the necessary activity for accessing, growing and sustaining IC in institutions (Marr, Schuima, & Neely, 2003). In other words, the successful management of IC is intently relaed to the KM processes an organization has in place, which, in turn, implies that the successful implementation and usage of KM ensures the acquisition and growth of IC.

Also IC is recognized as a crucial strategic asset for institutional performance and IC management has big importance for the competitiveness of organizations. According to the authors, identifying and visualization of IC provide an important advantage to the organization (Marr, Schuima, & Neely, 2003).

It is argued that the success of any business is directly related to the generation and management of its intellectual capital. Intellectual capital is often described as a system or model with three elements which are human capital, structural capital and customer or relational capital, or dichotomously as the combination of structural and human capital (April & Ahmadi-İzadi, 2004); (Skyrme D. J., 1999, s. 58). These three elements represent the organization's stock of intellectual capital. Human capital can, therefore, be defined as the capabilities of individuals and it includes the experience, expertise, know-how, innovation etc. that reside with the workers of an organization.

Structural capital relates to the infrastructure capabilities of the organization and is generally referred to what remains behind when all employees go home or when the employees who developed the capital are no longer with the organization. This consists of anything that gives the organization internal strength i.e. organizational culture, management and business processes, policies, training programmes, software, proprietary databases, the organization's image, patents, trademarks and information technology systems (April & Ahmadi-İzadi, 2004).

Customer capital promotes customer loyalty and is, consequently, the asset that gives an organization power in the market place. Brooking refers to it as a market asset (Teece, 2000) and it includes customer relationships, trademarks, brands, positioning, customer base, the organization's name, collaborations, various agreements and favorable contracts. According to April and Izadi an employee's attitude can be directly correlated to customer satisfaction (April & Ahmadi-İzadi, 2004).

The concept of abstract assets has become significant as organizations increasingly become more knowledge driven. Intellectual capital is far more of a significant factor in determining the future of a business than the shorter term traditional assets. The knowledge economy has required that every organization radically rethink what

constitutes its organizational value. It is, as a result, important that the balance sheet of an organization should not only reflect tangible assets but also include intangible assets in order to measure its growth, renewal, efficiency and capabilities. An organization is thus not merely a collection of physical, human resources and systems but rather a place where human assets are valued and considered as a key resource (Marr, Schuima, & Neely, 2003).

Within the work context, many knowledge workers are employed to generate intellectual property and often it is the organization that legally owns that intellectual property (Abell, 2001). Such organizations invest in abstract and according to Lehaney an organization's research, development, innovation and training policies should include actions aimed at stimulating innovation, creativity, and the competitive development of the organizations (Teece, 2000). Thus, it is necesaary that knowledge management should not only relate to the storage and manipulation of data and information but it should also recognize the value of the intangible assets contained in human minds and leverage them as organizational assets that can be accessed and used by a broader set of individuals on whose decisions the organization depends. Lehaney focuses on the need to include the management of intellectual assets on the strategic management agenda. (Lehaney, 2004)

2. 10 CMM and CMMI

Software Engineering Institute of Carnegie Mellon University developed Software Capability Maturity Model and Capability Maturity Model Integrated (CMMI). These reference models are created to measure the organization’s maturity in specified areas from chaotic to mature.

2.10.1 CMM

CMM model involves five aspects; these are Levels, Key Process Areas (KPAs) , Goals, Common features and Key practices. (Wikipedia, 2013)

CMM has five levels which describe a stage in maturity of an organization. Level one which is the lowest level of model shows undocumented repeat processes and the organization’s success is possible only with individuals’ success. This level is coined initially, chaotically or ad hoc. The level two, repeatable level indicates that the organization can repeat earlier successful performance in same conditions and processes are documented sufficiently. The third level, a.k.a defined level, the organization has standard processes and procedures. Moreover, training activities are managed regularly. The next level i.e. level four, the organization has set quality goals for both software products and processes quantitatively. Also, the organization has achieved control over products and processes. At the highest level, optimizing, the model underlines “continuously improvement” and “change management” terms, at this level the organization is able to review and improve processes continuously. (Paulk, Curtis, Chrissis, & Weber, 1993)

2.10.2 CMMI

CMMI is an extension of the SW-CMM with the following novelties: (1) new process areas are added, (2) best practices are added, and (3) generic goals that apply to every process area are added. Moreover, a continuous representation is available as the levelled representation of the SW-CMM. (Wikipedia, 2013)

The CMMI, just like the CMM, describes five levels of maturity. Level one (initial) means a process maturity that can be defined by unpredictable results. Ad hoc approaches, methods, notations, tools and reactive management all mean a process depending on the skills of the team to be successful. Level two (managed) refers to a process maturity defined by repeatable Project performance. At this level, the process is focused on Project level practices and activities. Level three (defined) means a process maturity defined by Project performance improvement within an organization. In order to be able to establish organization level activities and practices, level 2 key process areas are underlined as well. In addition to them, there are some other organizational process areas such as requirements development, technical solution, product integration, verification, validation, risk management, organizational training, organizational process focus, decision analysis and resolution, organization process definition and integrated Project management. Level four (quantitatively managed) refers to a process maturity defined by improving organizational performance. At this level, the results of level 3 projects can be used for tradeoffs with predictable results. Moreover, this level includes two more process areas which are organizational process performance and quantitative Project management. Finally, level five (optimized) means a process maturity which can be defined not only by reconfigurable organizational performance but also continuous process improvement. This level also offers some other process areas which are causal analysis and resolution and organizational innovation and deployment. (Walker, 2002)

2. 11. Knowledge Management Maturity Model (KMMM)

Maturity models describe the development of an entity over time, with the entity being anything that is of interest such as human being, an organizational function, technology and process. In general, maturity models have the following properties (Klimko, Knowledge Management Research report, 2000):

- Maturity models generally have four to six levels which show evolution of an entity.
- Each level must have requirement(s) that the entity has to succeed in that level,
- Levels are ordered sequentially, from an initial level up to an ending level (the latter is the level of perfection),
- From the initial level (Level 0 or Level 1), maturity levels are ordered sequentially up to a last level. (The bigger level shows more accomplishment).

- It is not possible to skip any level during measurement and the entity advances forward one level to the next level
- (Klimko, Knowledge Management Research report, 2000):

2. 11. 1 Infosys

Kochikar explained the knowledge management maturity (KMM) model practiced in Infosys technologies. The model was conceptualized to aid KM implementation at Infosys in specific and Software companies in general. KMM level 1(default) refers to no integrated KM system in place (Metha, Oswald, & Metha, 2007). Each subsequent level represented aspirations that Infosys wished to achieve. These levels represented a firm's ability to be: (2) reactive (basic KM), (3) aware (knowledge managed throughout the firm resulting in the ability to take decisions based on data), (4) convinced (effective KM with the ability to measure the advantages of productivity), and (5) ready to share (ability to shape technological and business environments). Infosys also focused on how to achieve these levels which required the simultaneous development of capabilities in three key result areas: people, processes, and technology.

2. 11. 2 APQC

Cindy et al. (2009) explained APQC Model, which is the stages of KM maturity acting as a roadmap so that KM activities can move from immature and inconsistent approaches to mature, disciplined approaches aligned with strategic business imperatives. The stages of KM maturity are integrated with APQC's stages of implementation; therefore, the implementation of each stage provides a foundation of success and a launching pad to the next stage. APQC's stage of KM maturity start with Level 1 as Initiate with focus on growing awareness, Level 2 called Develop with focus on localized and repeatable practices, Level 3 called standardized with focus on common processes and approaches, Level 4 called optimize focus on measured and adaptive and finally Level 5 called innovate with focus on continuously improving practices. APQC also defined the jump between the two levels as a form of knowledge, i.e. between moving to level 1 to 2, it is ad hoc knowledge, Level 2 to 3 it is applied knowledge, between level 3 to 4, it is enabled knowledge and between Level 4 to 5 it is scalable knowledge. At each level of the model, APQC lists down the key objectives to be achieved (Cindy & Darcy, 2009).

2. 11. 3 KMCA

Kulkarni & Freeze (2004) presented a knowledge management capability assessment (KMCA) methodology in order to determine the capability levels of an organization in various knowledge areas. The KMCA defines the knowledge capability areas and makes use of a five-level metric for assessing capabilities within each area. An empirical study was conducted to validate the ability of the KMCA methodology to correctly ascertain capability levels within knowledge areas. The validation consists of two different tests: The first test, called the absolute test, validates the five-level

metric within the KMCA by showing that a lower capability level is a prerequisite to achieve the next higher level. The second test, called the relative test, demonstrates the ability of the KMCA to compare relative capabilities (a) across knowledge areas within a single organization and (b) across multiple organizations for a given knowledge area (Kulkarni & Freeze, 2004).

2. 11. 4 KPQM

Table 2. 1 KPQM- Model

Maturity Level	Description
0 - Initial	The quality of KPs is not planned and changes randomly. This state can be best described as one of chaotic processes.
1- Aware	Awareness for knowledge processes has been gained. First structures are implemented to ensure a higher process quality.
2- Managed	This stage focuses on the systematic structure and definition of KPs which includes the clear assignment of responsibilities.
3- Standardized	A standard process scheme guarantees the achievement of a constant quality of results. Processes are tailored to react to special requirements. Standardization aspects can also be transferred to education and assignment of personnel.
4- Quantitatively Managed	To enhance the systematic process management, measures of performance are used to plan and track processes.
5 – Continuous Improvement	The focus on this stage lies on establishing structures for continuous improvement and self-optimization.

The KPQM Model by Paulzen and Perc, (2002) describes a maturity model for the assessment and systematic improvement of knowledge processes (KPs). It is based on the SPICE (Software Process Improvement and Capability Determination) framework and consists of the six maturity levels Initial, Aware, Managed, Standardized, Quantitatively Managed and Continuous Improvement (Table 2.2).

A maturity level aggregates several process attributes (e. g. knowledge process awareness, knowledge process management, standards for education and incentives) which can, in turn, be audited by related KM activities. Furthermore, the model structures the process attributes by distinguishing the four management areas process structure, personnel assignment and knowledge networks, acceptance as well as computer-based support to ensure a holistic approach towards KM implementation (Paulzen, Dourni, & Roibas, 2002).

2. 11. 5 5iKM

The 5iKM3 KMMM is part of the TATA Consultancy Services' KM implementation methodology. It identifies five states of maturity, namely initial, intent, initiative, intelligent and innovative. To sustain continuous growth, organizations need to progress step by step to attain the higher levels of knowledge maturity as there can be no short-cut to reach the highest maturity state. This can be achieved by systematically addressing three key foundation areas (KFA), namely people, technology and processes (TATAConsultancy, 1). The 5iKM3 acknowledges that disturbances in any of the three KFAs would result in a change in maturity state, but the impact would differ among KFAs and depend on the current maturity state. However, no specific details are given regarding these differences (Weerdmeester, Pocaterra, & Hefke, 2003).

2. 11. 6 Siemens

The Knowledge Management Maturity Model (KMMM) developed by SIEMENS Ehms & Langen (2002) consists of an analysis model and a development model. The analysis model creates transparency in all key areas of knowledge management and demonstrates the potential for improvement. The development model gives valuable information to attain the following maturity level. The combination of these two elements can assure the synchronous development and the ideal interlinking of the distinct key areas. There is a particular emphasis on this synchronization in an integral development process because isolated solutions do not have the chance of working in knowledge management. It uses the Radar chart to represent numerous levels with Strategy, Knowledge Objectives, Environment Partnerships, People Competencies, Collaboration culture, Leadership Support, Knowledge Structures/forms, Technology infrastructure and processes roles as eight spokes on that radar chart (Ehms & Langen, 2002).

2. 11. 7 G-KMMM

Based on comparison, assessment and integrating existing KMMs, Pee and Kankanhali have proposed a General KMMM (G-KMMM), which focuses on assessing the maturity of people, process and technology aspects of KM development in organizations (Pee & Kankanhalli, 2009). An accompanying assessment tool is also developed to facilitate practical application. The proposed G-KMMM follows a staged-structure and has two main components: maturity level and KPA. Each level is characterized in terms of three KPA's (people, process and technology), and each

KPA is described by a set of characteristics. These characteristics specify the key practices, which, when collectively employed, these can help organizations accomplish the goals of the particular maturity level. The model defined five staged as Initial, Aware, Defined, Managed and Optimizing. The assessment methodology is objective (Pee & Kankanhalli, 2009).

2. 11. 8 Klimko

Klimko (2001) built a KMMM with five stages which are initial, knowledge discoverer, knowledge creator, knowledge manager and knowledge renewer (Klimko, 2001). The model has no assessment methodology. Furthermore, it is not validated. The model focuses on the properties of each stage in terms of focus, key processes, challenge, tool, and pitfall. The model is referred as KMMM (Klimko).

2. 11. 9 KMMM Software Industry

Natarajan (2005) designed a KMMM for software industry with four stages which are called K-stages (Natarajan, 2005). Natarajan's model does not specify the assessment methodology. It is validated by case study approach. The Key Areas are business process readiness, technology infrastructure, human behavior and leadership.

2. 11. 10 K3M

Wisdom Source Technologies devised a KMMM with eight levels of maturity which are standardized infrastructure for knowledge sharing, top-down quality assured information flow, top-down retention measurement, organizational learning, organizational knowledgebase, process-driven knowledge sharing, continual process improvement and organizational self-actualization. (WisdomSource, 1998). This model pinpoints the features of different maturity levels in generic terms; hence, it does not determine definitive key areas. The model has no assessment or validation methodology and it specifies the characteristics of different maturity levels in generic terms, without explicitly identifying any specific key Areas.

2. 11. 11 KMMM Technology

Gottschalk constructed a Maturity Model is for Knowledge Management Technology in Law Firms with four stages namely, end user tools, who knows what, what they know and what they think (Gottschalk, 2002). The model has no assessment or validation methodology and it discusses the technology characteristics at every one of its levels. In addition, the model categorizes knowledge into core, advanced & innovative and administrative, declarative, procedural & analytical.

2. 11. 12 KPMG – Knowledge Journey

KPMG Consulting devised a KMMM as "Knowledge Journey" with five maturity stages which are knowledge chaotic, knowledge aware, knowledge focused,

knowledge managed and knowledge centric (KPMGConsulting, 2000). The model has no the assessment and validation methodology and specifies the characteristics of different maturity levels in three Key Areas: people, process, content and technology.

2. 11. 13 Strategic KMMM

Kruger and Snyman (2007) built a Strategic KMMM with six phases in maturity which are ICT as an enabler of KM, deciding on KM principles, ability to formulate organization-wide knowledge policy, building knowledge strategies, formulation of KM strategies and ubiquitous knowledge (Kruger & Snyman, 2007). The model has no assessment or validation methodology and specifies the characteristics of different maturity levels in generic terms.

2. 11.14 KM3

Gallagher and Hazlett constructed a different KMMM with has four stages which are K-aware, K-Managed, K-enabled, and K-optimized (Gallagher & Hazlett, 2004). The model has an objective assessment methodology. Moreover, the model is validated by applying a case study. There are three Key Areas identified in this model which are knowledge infrastructure, knowledge culture and knowledge technology.

2. 11. 15 KMMM Nuclear Industry

Boyles et al. devised a KM assessment tool with five levels in the context of nuclear industry (Boyles, et al., 2009). It identifies seven Key Areas which are policy, human resource, training, documentation, technology, tacit knowledge and KM culture. In the five-level model, each Key Area progresses from 'not utilized', 'to a little extent', 'to some extent', 'to a great extent' and 'to a very great extent'. Self-assessment methodology is also included.

2. 11. 16 KMMM (Serna)

Serna presented a new KMMM (Serna, 2013) which is called "knowledge management maturity model in Interpretativist perspective" in 2012 also this paper is a chapter of the book, *New research on knowledge management models and methods* (Hou, 2012). This model has affected Schultze's paradigms in the KM research, and claims that "the knowledge cannot be located in a specific place because it has not independent existence of human experience and social practices" (Schultze, 1998). Technology is not considered as a solution for knowledge activities, it can only support to the social activities. There are five levels namely, disposed, reactive, appreciative, organized and optimized. What is more, there are four features resources management, analytic management, significant management and active management.

2. 11. 17 V-KMMM

Weerdmeister et al. presented "Vision- KMMM" in 2003. This model was developed by a project, namely Next-Generation with acronym VISION, also the model is sponsored by EC part-sponsored research program (Weerdmeester, Pocaterra, & Hefke, 2003). Weermeister et al. combined 2 dimensions on maturity into single model: RTD oriented maturity model and organization oriented maturity model. The model does not follow a progressive maturity pathway. There are 4 different kf levels which applies Gallagher and Hazlet's "The Knowledge Formula". KF is elaborated in three dimensions, Ki-Organizational Knowledge Infrastructure, Kc- Knowledge Culture and Kt- Knowledge Technology.

2. 11.18 Frid

The Canadian Institute of Knowledge Management (CIKM) published Frid Framework to explain business-focused approach to KM. The framework included a KM Maturity Assessment which has 5 levels (starts from level 0 to 4) (Frid, 2003). The level names are orderly Knowledge chaotic, Knowledge aware, Knowledge focused, Knowledge managed and Knowledge centric. The framework introduces the roles of a healthy KM and a pathway to manage intellection capital.

2. 11. 19 Feng

Feng (Feng, 2006) constructed a five-leveled cmm-based model in 2006. There are management practices and management enabler for each maturity level. Management practices display creation, storage, sharing and application aspects of each level and management enablers show activities that the organization has to possess. The names of the levels are initialization, iterance, definition, management and optimization. The model has an assessment tool and it is applied in commercial bank; however, it is not validated.

2. 11. 20 KMMM Engineering Approach

Kuriakose et al. proposed a new KMMM (KMMM - An Engineering Approach) in 2011 (Kuriakose, Raj, Murty, & Swaminathan, 2011). The authors investigated 15 selected different KMMM's and then created a new model to eliminate their inadequacies. There are six maturity levels (starts from level zero to level five) and there are also five key maturity indicators which show different process areas in each level namely, people process, technology, knowledge, ROI. Each level's key maturity indicators have to acquire a quantitative value to satisfy that level. The next level's requirement value is increased than previous level. The model has an assessment methodology but it is not validated.

2. 12. Conclusion

In this chapter, the concepts of data, information and knowledge and the differences between them have been analyzed. Moreover, tacit and explicit knowledge and the

transfer between them have been explained. Finally, the importance and value of information have been emphasized and its place in knowledge economy has been pointed out.

Knowledge and knowledge management is important for all organizations. In order to be able to manage public funds, effective knowledge management is crucial for public institutions. Their acquisition, storage, distribution and reuse of knowledge activities need to be examined and improved to create knowledge sharing culture and adequate infrastructure. Maturity models explain the development of an entity over time and they can be used to find deficiencies and, thus, show a leveled way to improvement.

Knowledge Management Maturity Models describe the development of knowledge over time and over twenty models have been created by various authors in the literature. Also, they have been summarized in this section. In the next chapter, models will be analyzed morphologically and then a new model will be created

CHAPTER THREE:

EVALUATING MODELS AND DEVELOPING COMBINED KMM MODEL

3. 1. Introduction

This chapter provides the rationale for the model selection and explains the research progress.

At the end of Chapter 2, KMMMs have been introduced; however, it is needed to develop a new model needs to be developed for the following reasons:

- Various models present cultural aspects but Hofstede's cultural dimensions which are accepted worldwide are not included. By adding KM-related dimensions, the model can be improved.
- Combination of the key areas in different models is needed
- Measuring different KM-related areas produces multi-results and comparison possibility. Combination of different models' key areas is needed.
- CMM approach is used to define improvement domains globally. This approach is accepted worldwide and can be used as a guide.
- When determining the requirements of each level, the literature should be reviewed.

In order to be able to develop a new model firstly, a morphological analysis will be performed. Secondly, selected models will be investigated. finally, new combined model will be developed step-by-step.

3. 2. Morphological Analysis

As it has been studied in the previous chapter, there are numerous Knowledge Management Maturity Models (KMMMs) in literature. In order to select true maturity model, Kuriakose (K.Kuriakose, 2009) has examined categorized and morphologically analyzed 15 different models.

Morphological Analysis was firstly coined by Fritz Zwicky (Zwicky, 1966). It begins with identifying and defining the dimensions (parameters) and possible options of the

entity to be analyzed. A morphological box (a.k.a Zwicky box) is established by setting the dimensions and options in an n dimensional matrix.

While KMMMs in literature Kurikose has selected 6 dimensions and options. These are Context, Applicability, Stages, Assessment, Validation, and Key Areas. However, *in this thesis*, Kuriakose's Morphological Analysis has been expanded by adding five new models and the dimension related with CMM. Table 3.1 shows the model names and their authors. It should be noted that that the first fifteen models have already been studied by Kuriakose, and last five models have been added. The number column corresponds the model number , themodel name column shows the name and the distinctive feature in parantheses (e. g. organization, author, specific industry) . The author column shows the author name and the years are shown in parentheses.

Table 3. 1 Model names and authors of Extended (K.Kuriakose, 2009) morphological analysis

No.	Model Name	Author
1	KMMM (Infosys)	(V.P.Kochikar, 2000)
2	KMMM (APQC)	(Hubert, 2009)
3	KMCA	(Kulkarni U. a., 2004)
4	KMMM	(Klimko, Knowledge Management and Maturity Models: Building Common Understanding, 2001)
5	Knowledge Journey	(KPMGConsulting, 2000)
6	KMMM (Software Industry)	(Natarajan, 2005)
7	KPQM	(Paulzen, Dourni, & Roibas, 2002)
8	5iKM3	(TATAConsultancy, Mohanty and Chand 2005)
9	K3M	Wisdom Source (2004)
10	KMMM (Technology)	Gottschalk (2002)
11	KMMM (Siemens)	Ehmsand Langen (2002)
12	Strategic KMMM	Kruger and Snyman (2007)
13	KM3	Gallagher and Hazlett
14	G-KMMM	Pee and Kankanhalli (2009)
15	KMMM (Nuclear Industry)	Boyles et al (2009)
16	KMMM (Serna) *	Serna (2012)
17	V-KMMM*	Weerdemeister (2003)
18	Frid Framework*	Frid (2003)
19	Feng KMMM*	Feng (2006)
20	KMMM Engineering Approach*	Kuriakose (2011)

*:new models

Seven different dimensions and their options have been defined and examined.

Context

According to Kuriakose, context is where the maturity model has been developed and it has three options which are General, Organization, and Industry Sector.

Applicability

According to Kuriakose, applicability is the body to which the model can be applied. The maturity model may be applicable in general to any organization, or it may be applicable only for the specific organization. There are three options, General, Organization,and Industry Sector.

Stages

As discussed in Chapter 2 (Section 2. 11. Knowledge Management Maturity Model (KMMM), maturity models generally have four to eight stages. The dimension "Stages" indicates the number of stages from the lowest level of perfection to the highest level of perfection. In this area, Kuriakose set up three choices which are 4, 5, 6 and 8.

Assessment

According to Kuriakose, *assessment* shows the methodology suggested or described in the model to assess the KMM of the organization. It could be either objective or subjective. Subjective Assessment means that the evaluation is purely based on the opinion expressed by various stakeholders whereas Objective Assessment means that the evaluation involves the collection and analysis of evidence to support the opinion expressed by numerous stakeholders. The "Assessment" dimension has three different values which are Subjective, Objective, Not known.

Validation

Validation expresses the methodology exploited to validate the model. The model could be validated by empirical methods or by case study method where two or more organizations are studied. It has three different values which are as Case Study, Empirical, and Not known.

Key Areas

As discussed earlier, knowledge management maturity models have key areas to characterize different maturity stages. Some models used "people, process, technology", but it is not a standard. Few models added "content", "data", "knowledge", "documents" etc. Also some of the models do not have specify key areas. This dimension has two values, namely General and Specific.

CMM –Based

CMM is a maturity model which is used widely and specially developed for Software Process Improvement. Some Knowledge Management Maturity Models (KMMMs) have been derived from CMM or its latest version CMMI. Generally these models have five levels similar to CMM. CMM-Based dimension in the morphological

analysis table has two different values which are as follows: CMM-Based, Non CMM-Based.

Table 3.2 shows morphological analysis classification table. The dimension number shows dimensions from 1 to 7 and the dimension names are listed. Dimension column shows dimension name, the Options column shows the options these dimensions, models column shows the names of the models and the number of models shows how many models are included in this option.

Table 3. 2 Extended (K.Kuriakose, 2009) morphological analysis table

Dimension No	Dimension	Options	Models	No. of Models
1.	Context	General	KMMM (APQC) , KMMM (Klimko) , Knowledge Journey, KPQM, K3M, Strategic KMMM, KM3, G-KMMM, KMMM (Serna) *, V-KMMM*, Frid Framework*, Feng KMMM*, KMMM Engineering Approach*	13/20
		Organization	KMMM (Infosys) , KMCA, 5iKM3, KMMM (Siemens) ,	4/20
		Industry Sector	KMMM (Software Industry) , KMMM (Technology) , KMMM (Nuclear Industry)	3/20
2.	Applicability	General	KMMM (Infosys) , KMMM (APQC) , KMCA, KMMM (Klimko) , Knowledge Journey, 5iKM3, KMMM (Siemens) , KPQM, K3M, Strategic KMMM, KM3, G-KMMM, KMMM (Serna) *, V-KMMM*, Frid Framework*, Feng KMMM*, KMMM Engineering Approach*	17/20
		Organization		0/20
		Industry Sector	KMMM (Software Industry) , KMMM (Technology) , KMMM (Nuclear Industry) ,	3/20
3.	Stages	4	KMMM (Software Industry) , KMMM (Technology) , KM3, V-KMMM*,	4/20
		5	KMMM (Infosys) , KMMM (APQC) , KMMM (Klimko) , Knowledge Journey, KPQM, 5iKM3, KMMM (Siemens) , G-KMMM, KMMM (Nuclear Industry) , KMMM (Serna) *, Frid Framework*, Feng KMMM*, KMMM Engineering Approach*	13/20
		6	KMCA, Strategic KMMM	2/20
		8	K3M	1/20
4.	Assessment	Subjective	KMCA, KMMM (Nuclear Industry) , Frid Framework*, KMMM Engineering Approach*, Feng KMMM*,	5/20
		Objective	KMMM (Infosys) , 5iKM3, KMMM (Siemens) , KM3, G-KMMM,	5/20

Dimension No	Dimension	Options	Models	No. of Models
		Not known	KMMM (APQC) , KMMM (Klimko) , Knowledge Journey, KMMM (Software Industry) , KPQM, K3M, KMMM (Technology) , Strategic KMMM, KMMM (Serna) *, V-KMMM*,	10/20
5.	Validation	Case Study	KMMM (Infosys) , KMMM (APQC) , KMMM (Klimko) , Knowledge Journey, KPQM, 5iKM3, K3M KMMM (Technology) , KMMM (Siemens) , Strategic KMMM, KM3, KMMM (Nuclear Industry) , V-KMMM*	13/20
		Empirical	KMMM (Software Industry) , G-KMMM, KMCA	3/20
		Not known	KMMM (Serna) *, Frid Framework*, Feng KMMM*, KMMM Engineering Approach*	4/20
6.	Key Areas	General	KMMM (APQC) , KMMM (Klimko) , K3M, Strategic KMMM, KMMM (Serna) *, Feng KMMM*,	6/20
		Specific	KMMM (Infosys) , KPQM, 5iKM3, G-KMMM, KMCA, Knowledge Journey, KMMM (Software Industry) , KMMM (Technology) , KMMM (Siemens) , KM3, KMMM (Nuclear Industry) , V-KMMM*, Frid Framework*, KMMM Engineering Approach*	14/20
7.	CMM-Based	Yes	KMMM (Infosys) , KPQM, G-KMMM, KMCA, KMMM (Software Industry) , KMMM (Siemens) , KMMM (Nuclear Industry) , KMMM (APQC) , KMMM Engineering Approach*, Strategic KMMM, Feng KMMM*	11/20
		No	KMMM (Technology) , V-KMMM*, Frid Framework*,5iKM3, KM3, Knowledge Journey, KMMM (Klimko) , KMMM (Serna) *	9/20

As depicted in Table 3.2 ,Kuriakose's Morphological Analysis is extended with adding 5 more models and adding a new dimension (CMM-based).The main purpose of creating this table is to enhance the reference model selection.

In context dimension, there are three options, namely, general, organization and industrial sector. There are thirteen models with "general" context, four models which have "organization" context and three models which have "industry sector" context.

In the second dimension (Applicability), it is clear that the "general" option is very crowded (17 models) . Like the context dimensions, there are three models whose applicability option includes the "industry sector".

In the "stages" dimension, there are four options namely 4, 5, 6 and 8 levels. It should be noted that CMM-based models have 5 levels. 6-level models have Level-0

which means there is no sign of knowledge management and the other levels are almost the same with 5-level models.

The fourth dimension (Assessment) is very important because some authors created a KMMM, identified goals and created levels but they did not suggest a validation tool or methodology to measure different organizations. As it is clear from the table, there are nine out of twenty models which have assessment tool. Four of them have subjective assessment and the rest have objective assessment.

Validation is also an important dimension on the table. Validated models are preferable for this work. There are 16 models that have been validated by empirical research or case studies.

Another dimension is "Key Areas" which shows the scope of the models and main focus areas. 14 out of 20 models have "specific" Key Areas. Specific models measure an organization according to its key areas, whereas general key area models produce only one measurement. With models that have multiple key areas, analyzers are able to demonstrate different key area maturity levels; consequently, low-level areas can be observed.

The last dimension is "CMM-Based" which shows whether the models are based on CMM or not. Half of the models are based on CMM. As mentioned earlier CMM and CMMI are accepted globally as a maturity model.

3. 3. Research Model

In this section, KMCA and G-KMMM are examined, cultural factors are added and then a new combined model is created.

3. 3. 1. KMCA

As introduced in Chapter 2 (Section 2. 11. 3 KMCA) , Kulkarni's model is Knowledge Management Capability Assessment (KMCA) . This model has been developed, tested, validated and it has six levels namely, Difficult/Not Possible (Level 0) , Possible (Level 1) , Encouraged (Level 2) , Enabled/Practiced (Level 3), Managed (Level 4) , Continuously Improved (Level 5) .

The authors (Kulkarni & St.Louis, 2003) published three different papers to develop the model and to validate at the different scale of organizations. In 2003, they developed organizational self-assessment of Knowledge Management Maturity with a survey instrument. The survey instrument consists of 25 questions which are yes/no questions and some questions about frequency (Likert-type questions). This instrument was applied as a pilot study in Intel's Corporate Quality Network (CQN) and 38 people from various groups completed this survey. Results and limitations were presented (Kulkarni & St.Louis, 2003). In 2004, they presented a six-levelled (starts from level 0 to level 5) model and made an empirical study (145 questions about KM) which covered two independent organizational units within a company with a population about 700 employees. For the robustness of their study, the authors

constructed validation principles of translation validity and criterion-related validity (absolute test and relative test) and they claimed that their model is robust. (Kulkarni & Freeze, 2004). In 2005, they published a measurement tool that assesses the validation of this model. However, this model is not a maturity model. There were four different Key Capability Areas namely *Expertise, Lessons Learned (LL), Knowledge Documents (KD) and Data*. They developed KMCA Instrument which consists of 130 questions in relation to these KCA's. Second Order and General Specific structural equation of each KCA provided the validity of these measurements. (Freeze & Kulkarni, 2005).

The authors specified four different key areas which they named as Knowledge Capability Areas (KCA) . *Expertise, Lessons Learned (LL), Knowledge Documents (KD) and Data*. *Expertise* gained through experience or formal education, is one of KCA's. *Lessons Learned* is successes and failures that are documented from similar past projects. On *LL* dimension, the model measures the usage and effects of past success scenarios. *Knowledge Documents* is basically explicit knowledge materials which an organization can learn from. The Last KCA is Data which was discussed in Chapter 2 (Section 2. 3. 1. Data) and it is the fact or figures obtained originally from operations and stored in databases or warehouses etc. *Data* may be raw (unprocessed) but the authors mean that in the KCA data is not operational. They mentioned predictable historical data that can be used for planning, pattern matching, mining and model building.

The authors identified clearly the goals of each level and divided them into two categories. The first category is "behavior" which indicates the goals of perception to the employees' behavior. The second category is "infrastructure" which indicates the structure to share knowledge across the organization.

At Level 0, *Difficult/Not possible,* there are no goals. It shows a chaotic organization situation where knowledge sharing operations are discouraged. Knowledge is not defined as an asset for the organization.

At Level 1, *Possible,* some people in the organization understand the value of knowledge and sharing. Knowledge is identified as an organizational asset.

At Level 2, *Encouraged*, executive managers reward sharing so organizational knowledge sharing operations are encouraged. On the technical side, explicit knowledge assets are stored in some fashion, the organization knows tacit knowledge's value but it cannot be stored.

At Level 3, *Enabled/Practiced,* sharing operations take place within the whole organization. Senior managers set goals to apply successful knowledge sharing and understand the significance of knowledge. Also Knowledge Management Systems, tools or mechanisms existed in the organization. Knowledge is categorized by creating taxonomies clearly.

At Level 4, *Managed,* it is easy to share knowledge sharing it with all employees. The locations of knowledge assets can be traceable, knowledge sharing operations can be managed and formally/informally monitored. Training and instruction are available for Knowledge Management usage. Organization's KM practices are introduced by using change management principles.

At Level 5, *Continuously Improved*, there is a wide and organized effort to enhance knowledge sharing operations. Business processes for knowledge sharing are improved and, also, tools and systems are periodically updated for better performance.

Table 3.3 shows the summary of knowledge processes from the point of behavioral and structural goals.

Table 3. 3 KMCA Levels with Associated General Goals (adapted from (Kulkarni U. a., 2004))

Capability Level	**Behavior Goals**	**Infrastructure Goals**
Level 1: Possible	- Knowledge sharing is not discouraged - There is a general willingness to share	- Knowledge assets are recognized/identified
Level 2: Encouraged	- Organization's culture encourages/rewards all activities w/respect to sharing of knowledge assets - Leadership communicates commitment to knowledge sharing	- Explicit knowledge assets are stored in some fashion - Tacit and implicit knowledge is tracked
Level 3: Enabled/Practiced	- Sharing of knowledge assets is practiced - Leadership/senior management sets goals with respect to knowledge sharing - KM related activities are a part of normal workflow	1. KM systems/tools and mechanisms enable activities with respect to knowledge sharing 2. Repositories/knowledge taxonomies exist
Level 4: Managed	- Employees find it easy to share knowledge assets - Knowledge sharing is formally/informally monitored/measured	- Training /instruction/tools available for KM system usage - Change management principles are used to introduce KM practices
Level 5: Continuously Improved	- Mechanism and tools to leverage knowledge assets are widely accepted - There is a systematic effort to measure and improve knowledge sharing	- Business processes /tools/mechanisms that support sharing of knowledge assets are periodically reviewed/improved

This model has a question set which includes 102 questions about 4 KCA's.

3. 3. 2. G-KMMM

General Knowledge Management Maturity Model is developed by Pee and Kankanhalli. The authors examined many KMMMs until 2009 and divided them into two types, CMM-Based and Non-CMM –Based. They created a new CMM-Based model and coined G-KMMM. (Pee & Kankanhalli, 2009)

The model defines three Key Process Areas (KPA) . These are People/Organization, Process and Technology. People/Organization area focuses on culture and organization's strategies and policies. Process area focuses on Knowledge management processes and technology area investigates the technology related to vision about KM technology and infrastructure.

The model identifies five level maturity like most CMM-Based models (KMCA is an exception because it starts with level-0, and the rest of levels are based on CMM). Levels are in the order of Initial, Aware, Defined, Managed/Established and Optimizing/Sharing.

At Level 1, *Initial*, the organization has little or no intention to use organizational knowledge. Knowledge is not counted as a critical asset for the organization by employees. People do not know how to manage knowledge resources. There are no

specified processes to acquire, disseminate or reuse operations. Moreover, there are no technologies supports KM initiatives.

At Level 2, *Aware*, organization considers knowledge as an asset and executives are aware that KM is necessity. Documentation processes are encountered; furthermore, small pilot projects are performed through the organization.

At Level 3, *Defined*, organizational knowledge management is defined clearly and it sets up a basic infrastructure that supports knowledge. Management supports K-the knowledge sharing operations of the employees. Processes are formalized and KM metrics are used to increase productivity that is related to KM. Technology usage enhances knowledge sharing operations which means that basic infrastructure can be mentioned.

At Level 4, *Managed/Established*, Knowledge Management is within the whole organization. Knowledge is an important asset in the organization strategy and personal and group training are standardized. KM processes are measured quantitatively (i. e. metrics) . Enterprise-wide KM systems are in place and different systems are integrated to provide more productivity.

At Level 5, *Optimizing / Sharing*, Organizational sharing is institutionalized; in addition, KM processes and technologies are continuously improved.

The levels and their explanations in accordance with KPA description are presented in Table 3.5.

The authors created an objective assessment methodology and validated their model with a case study. There are 27 questions for three KPAs (Pee & Kankanhalli, 2009). Some questions adopted different KMMMs levels and this is stated in the table. The rest of the questions are self-developed. The distribution of the questions are shown in Table 3.4.

Table 3. 4 G-KMMM Distribution of questions (Pee & Kankanhalli, 2009)

Level	People	Process	Technology
2- Aware	3	1	2
3- Defined	7	2	1
4- Managed	4	2	2
5- Optimizing	1	1	1
Total	15	6	6

Table 3. 5 G-KMMM – Model (Pee & Kankanhalli, 2009)

	Maturity el	General description	Key process areas		
			People	**Process**	**Technology**
1	**Initial**	Little or no intention to formally manage organizational knowledge	Organization and its people are not aware of the need to formally manage its knowledge resources	No formal processes to capture, share and reuse organizational knowledge	No specific KM technology or infrastructure in place
2	**Aware**	Organization is aware of and has the intention to manage its organizational knowledge, but it might not know how to do so	Management is aware of the need for formal KM	Knowledge indispensable for performing routine task is documented	Pilot KM projects are initiated (not necessarily by management)
3	**Defined**	Organization has put in place a basic infrastructure to support KM	— Management is aware of its role in encouraging KM — Basic training on KM are provided (e.g., awareness courses) — Basic KM strategy is put in place — Individual KM roles are defined — Incentive systems are in place	— Processes for content and information management is formalized — Metrics are used to measure the increase in productivity due to KM	— Basic KM Infrastructure in place (e.g., single point of access) — Some enterprise-level KM projects are put in place
4	**Managed**	KM initiatives are well established in the organization	— Common strategy and standardized approaches towards KM — KM is incorporated into the overall organizational strategy — More advanced KM training Organizational standards	Quantitative measurement of KM processes (i.e., use of metrics)	— Enterprise-wide KM systems are fully in place — Usage of KM systems is at a reasonable level — Seamless integration of technology with content architecture
5	**Optimizing**	KM is deeply integrated into the organization and it continually improved upon	Culture of sharing is institutionalized	— KM processes are constantly reviewed And improved upon —Existing KM processes can be easily adapted to meet new business requirements — KM procedures are an integral part of the organization	Existing KM infrastructure is continually improved

3. 3. 3. Cultural Factors in Maturity

Geert Hofstede started a study in 1980 to identify cultural differences across countries (Hofstede, 1980) and collected values from over 100,000 employees of multinational IBM firm in 40 different countries (Hofstede, 1980, 1983, 1991, 1997, 2001). The author has published the results incrementally on a website.

Hofstede has created four dimensions, namely, power distance, uncertainty avoidance, individualism and masculinity.

Power distance dimension is defined as "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (Hofstede, Culture's Consequences: International Differces in Work-Related Value, 1980).

Turkey's score is high on this dimension (score of 66). This means that generally, dependent, hierarchical, superiors are often inaccessible and the ideal boss is a father figure. Power is centralized and managers rely on their bosses and on rules. In this study, power distance in the workplace is important. Hofstede focused on PDI in the workplace and explained large-power distance situation as follows (Hofstede, 2010 – p88):

- Superiors and subordinates consider each other as existentially unequal,
- The hierarchical system is based on this existential inequality,
- Organizations centralize power as much as possible in a few hands,
- Salary systems show wide gaps between top and bottom in the organization,
- Superiors are entitled to privileges (i.e. literally "private laws"). (Hofstede & Hofstede, 2010)

Uncertainty Avoidance dimension is defined as "the extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid."

Turkey's score is high on Uncertainty avoidance (UAI) dimension (score of 85). On Turkey's UAI dimension, Hofstede commented that:

> *Turkey scores 85 on this dimension and thus there is a huge need for laws and rules. In order to minimize anxiety, people make use of a lot of rituals. For foreigners they might seem religious, with the many references to "Allah", but often they are just traditional social patterns, used in specific situations to ease tension.* (Hofstede, What about Turkey? - The Hofstede Center, 2010)

On strong *uncertainty avoided* cultures, some common situations are encountered (Hofstede, 2010 – p208):

- People have more worries about health and money,
- There is a hesitancy toward new products,
- People are more cautious about their spending and investments,

- There is an emotional need for rules, even if they will not work,
- There is a need for precision and formalization,
- Top managers are generally concerned with daily operations, not strategy,
- People focus on the content of the decisions not on the decision process. (Hofstede & Hofstede, 2010)

Individualism dimension is defined as, "the degree of interdependence a society maintains among its members." It has to do with whether people´s self-image is defined in terms of "I" or "We" by Hofstede.

If a country's score is less than 50 out of 100, this means the country is collectivist; otherwise, the country is individualist.

Turkey's score is 37 so it is collectivist.

General characteristics of a collectivist culture are (Hofstede, 2010- p124) :

- People are born into extended families or other in-groups that continue protecting them in exchange for loyalty.
- "We" is more important than "I",
- Occupational mobility is lower,
- Management is the management of groups not individuals,
- The employer-employee relationships is basically moral, like a family link,
- Relationships prevail over tasks,
- Employees are members of in-groups who will pursue the in-group's interest.
- In-group customers get better treatment (i.e. particularism) (Hofstede & Hofstede, 2010)

Masculinity- Femininity, A high score (masculine) on this dimension indicates that the society will be driven by competition, achievement and success, with success being defined by the winner / best in field – a value system that starts in school and continues throughout organizational behavior.

A low score (feminine) on the dimension means that the dominant values in society are caring for others and quality of life. A feminine society is one where the quality of life is the sign of success and standing out from the crowd is not admirable.
Hofstede evaluates Turkey in this dimension with these sentences:

> *Turkey scores 45 and is in the "middle" of the scale but more on the feminine side. This means that the softer aspects of culture such as leveling with others, consensus, sympathy for the underdog are valued and encouraged. Conflicts are avoided in private and work life and consensus at the end is important. Leisure time is important for Turks, it is the time when the whole family, clan and friends come together to enjoy life. Status is shown, but this comes more out of the high PDI.* (Hofstede, What about Turkey? - The Hofstede Center, 2010)

3. 3. 4. Combined Model

In this research, performing a measurement within public organizations with a more comprehensive model has been intended. To achieve this objective, five steps have been followed:

1. selecting models,
2. extending the selected models,
3. adding cultural dimension,
4. combining models,
5. developing proposed model.

Research model is summarized in Figure 3.1

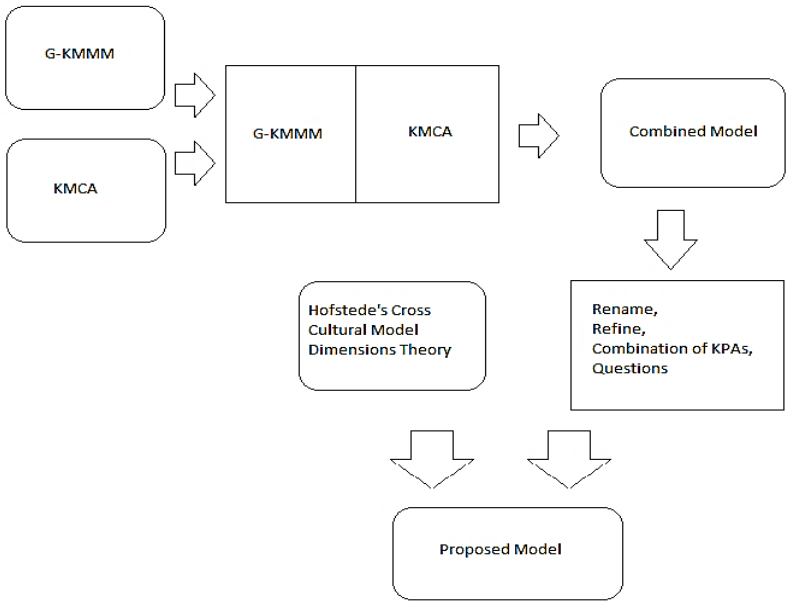

Figure 3.1 Research model

After the proposed model is developed, it has been applied in four public agencies in Turkey through a questionnaire and interview developed, and the results have been analyzed to validate the proposed model.

3. 3. 4. 1. Step1: Selecting Models

At the first step, one or more selected models have been analyzed to be used to measure maturity. Seven different dimensions have been introduced in Morphological Analysis (Section 3. 2) so as to enhance the selection process.

In the first dimension, *Context,* there were three options which are general, organization and industry sector. The models with "industry sector" context are not suitable for this study, which has made the selection of "organization" and "general" context models inevitable.

In the second dimension, *Applicability*, there were three options which are general organization and industry sector. For the same reason as "Context" dimension, the models that have "industry sector" applicability ones were eliminated.

In the third dimension, *Stages*, there were four options, 4, 5, 6 or 8. Only one "eight staged" model (K3M) was eliminated from the list because this model failed to show significant differences between levels; in other words, eight stages were found to be excessive for a maturity model.

In the fourth dimension, *Assessment,* there were three options, subjective, objective and not-known. "Not-known" models were eliminated since selecting models that specified clearly how to assess knowledge was required. "Subjective" or "objective" models were found suitable for this research.

In the fifth dimension, *Validation*, there were three options, Empirical, Case Study and Not-known. Validation was crucial for the robustness of models; hence, empirical or case study validated models were found suitable for this study.

In the sixth dimension, *Key Areas*, there were two options, General and Specific. "Specific" models focused on different key areas on organization, and produced more measurements than general models. For example, applying KMCA model in an organization was able to measure Expertise, Data, Knowledge Documents, Lessons Learned, Culture areas. Furthermore, it showed the general situation of organization. For these reasons "specific" models were preferred.

In the last dimension, *CMM-Based*, the models based on Carnegie Mellon University's CMM/CMMI model, as mentioned in chapter 2 (Section 2. 10 CMM and CMMI) have been preferred due to worldwide wide-acceptance.

Table 3. 6 Selection Policy

Dimension Name	**Reason to select option**	**Reason NOT to select option**
Context	General, Organization	Industry Sector
Applicability	General, Organization	Industry Sector
Stages	4,5 and 6	8
Assessment	Objective, Subjective	Not Known/Not Available

Validation	Case Study, Empirical	Not Known/Not Available
Key Areas	Specific	General
Cmm-Based	Cmm-based	Non-cmm based

Table 3.7 clearly shows the seven dimension options of each model.

Table 3. 7 Dimensions and Options

No.	Model Name	Context	Applicability	Stages	Assessment	Validation	Key Areas	Cmm-Based
1	KMMM (Infosys)	Organization	General	5	Objective	Case study	Specific	Yes
2	KMMM (APQC)	General	General	5	Not known	Case study	General	No
3	KMCA	Organization	General	6	Subjective	Empirical	Specific	Yes
4	KMMM	General	General	5	Not known	Case study	General	No
5	Knowledge Journey	General	General	5	Not known	Case study	Specific	No
6	KMMM (Software Industry)	Industry sector	Industry sector	4	Not known	Empirical	Specific	Yes
7	KPQM	General	General	4	Not known	Case study	Specific	Yes
8	5iKM3	Organization	General	5	Objective	Case study	Specific	No
9	K3M	General	General	8	Not known	Case study	General	No
10	KMMM (Technology)	Industry sector	Industry sector	4	Not known	Case study	Specific	No
11	KMMM (Siemens)	Organization	General	5	Objective	Case study	Specific	Yes
12	Strategic KMMM	General	General	6	Not known	Case study	General	Yes
13	KM3	General	General	4	Objective	Case study	Specific	No
14	G-KMMM	General	General	5	Objective	Empirical	Specific	Yes
15	KMMM (Nuclear Industry)	Industry sector	Industry sector	5	Subjective	Case study	Specific	Yes
16	KMMM (Serna)	General	General	5	Not Known	Not Known	General	No
17	V-KMMM	General	General	4	Not Known	Not Known	Specific	No
18	Frid Framework	General	General	5	Subjective	Not Known	Specific	No
19	Feng KMMM	General	General	5	Not Known	Not Known	General	No
20	KMMM Engineering Approach	General	General	5	Subjective	Not Known	Specific	Yes

After morphological analysis, KMCA and G-KMMM to measure "Turkish Public Institutions Knowledge Maturity level" has been chosen. The reasons for this can be summarized as follows:

- Using only one model can be considered as feasible for this study; however, including some different requirements by referring to the literature.
- These two models have open question sets that can be used after some modifications.
- Assessment methods (KMCA-Subjective, G-KMMM-Objective) are different. As a result, at the end of the analysis, more results can be obtained for comparison.
- Two models cover wide Key Areas (i.e. G-KMMM- People, Process, Technology and KMCA- Data, Knowledge Documents, Expertise and Lessons Learned).
- By using KMCA model's assessment tool objects, the organizations' past experience and "lessons learned" can be clearly measured. By measuring the organizations past experiences as a key process area, i.e. showing the effective reuse of knowledge, showing the effective reuse of knowledge which improves the organizational memory is aimed at.
- The authors of G-KMMM (Pee and Kankanhalli) have examined other models deeply and have created the Assessment tool that covers the levels other models. This situation enables this study to cover not only these two models, but also the requirements of other models.

Maturity levels presented by these two models will be discussed in this section.

KMCA model starts with level zero indicating that there is no signal of knowledge. It is claimed by the researcher that this is not possible, as every organization has to communicate and this is the starting point of sharing. To combine these two models, their levels and goals need to be seen. In order to do this objectively, CMMI levels have also been added to the proposed model. CMMI, KMCA and G-KMMM have been analyzed and their levels and goals are depicted in Table 3.8.

At level 1, CMMI indicates that only specific practices are performed and the success of the organizations depends on some personal efforts. KMCA states that knowledge assets are recognized and people are willing to share knowledge, which causes the maturity level to increase from 0 to 1. G-KMMM states that only little intention exists to manage organizational knowledge at this level. The models approached do not contradict at this first level. They commonly claim that some people in the organization define knowledge as an asset but knowledge sharing operations are very limited.

At Level 2, CMMI explains an organizational policy and process planning and observation. Moreover, training activities start at this level though these efforts are not systematically managed. KMCA states that *value of knowledge* is recognized by the organization. *Organizational culture* fosters individuals to share *knowledge.* Also, management encourages knowledge sharing operations. On the technical side, KMCA states that storing operations are available in some fashion at this level, but this function

is not managed regularly. “Who knows what?” questions are asked and known by management and the answers to this are basically traced. According to G-KMMM, the organization is aware of and has the intention to manage its organizational knowledge; however, the organization struggles to know how to apply.

At Level 3, CMMI emphasizes to establish one or many defined process (es). Furthermore, the organization is aware of collected improvement information. At this stage the organization can be called “institutionalized”. KMCA states at this level, sharing of knowledge assets is practiced and happens everywhere and every time. Senior management targets effective knowledge sharing activities and sets goals for sharing. The organization has a centralized repository at this level and has an organizational taxonomy. G-KMMM proposed a basic infrastructure to support KM and this infrastructure is set up at this level.

At Level 4, CMMI focuses on establishing quantitative objectives for process (es). KMCA claims that knowledge sharing is easy and throughout the organization locating and managing knowledge assets are monitored. Training activities are organized properly and Change Management is used to introduce KM practices. G-KMMM states that organization’s KM processes can be measured quantitatively. Technology and content are associated greatly in the organization. The organization manages training activities.

At Level 5, the keyword is “continuous improvement” for these three models based on the data collection through operational systems and feedback analysis.

Table 3.8 shows CMMI, KMCA and G-KMMM’s levels and goals.

Table 3. 8 CMMI, KMCA and G-KMMM Levels and Goals

	CMMI (Paulk, Curtis, Chrissis, & Weber, 1993)	KMCA(Kulkarni & Freeze, 2004)		G-KMMM(Pee & Kankanhalli, 2009)
0	N/A	•Knowledge sharing is *discouraged.* • There is general *unwillingness* to share knowledge. • People *do not seem to value* knowledge sharing	• There is a *lack of identification* of knowledge assets.	N/A
1	Perform Specific Practices	• Knowledge sharing is *not discouraged.* There is a *general willingness* to share. •Some people, who understand the value of knowledge sharing	• Knowledge assets are *recognized/ identified.*	• Little or no intention to formally manage organizational knowledge
2	• Establish an Organizational Policy • Plan the Process • Provide Resources • Assign Responsibility • Train People • Manage Configurations • Identify and Involve Relevant Stakeholders • Monitor and Control the Process • Objectively Evaluate Adherence • Review Status with Higher Level Management	• *Value of knowledge assets* is *recognized* by the organization. • Organization's *culture encourages* all activities with respect to sharing of knowledge assets. • Leadership/senior management *communicates the value of* and *shows commitment* to knowledge sharing • Sharing is *recognized/rewarded*.	• Explicit knowledge assets are *stored* in some fashion. • Tacit and implicit knowledge is *tracked*.	• Organization is aware of and has the intention to manage its organizational knowledge, but it might not know how to do so

Table 3.8:Continued

3	• Establish a Defined Process • Collect Improvement Information	• Sharing of knowledge assets is *practiced*.	• Knowledge management systems/tools and mechanisms *enable* activities with respect to knowledge sharing.	Organization has put in place a basic infrastructure to support KM
		• Leadership/senior management *sets goals* w. r. t_ knowledge sharing.	• Centralized *repositories* exist.	
		• KM related activities are a *part of normal workflow*.	• Knowledge *taxonomies* exist.	
4	• Establish Quantitative Objectives for the Process • Stabilize Sub process Performance	• Employees *find it easy to share* knowledge assets. • Employees expect to be successful in locating knowledge assets if they exist. Knowledge sharing is formally/informally monitored/measures.	• *Training and instruction* is available for KM systems usage. • *Change management* principles are used to introduce KM practices.	KM initiatives are well established in the organization
5	• Ensure Continuous Process Improvement • Correct Root Causes of Problems	• Mechanisms and tools to leverage knowledge assets are *widely accepted*. • There is a *systematic* effort to *measure and improve* knowledge sharing.	• Tools for supporting KM activities are *easy to use*. • Tools and mechanisms for sharing are *periodically updated/improved*. • Business processes that incorporate sharing of knowledge assets are *periodically reviewed*.	• KM is deeply integrated into the organization and is continually improved upon • It is an automatic component in any Organizational processes

3. 3. 4. 2. Step2: Deficiencies/Gap of Selected Models

KMCA and G-KMMM models have been examined to enhance the proposed KMMM. In this section, criticisms of these two models are listed.

The combined model starts from Level 1, unlike KMCA (there is level 0) model, because every organization has little knowledge transferred on a daily basis (e.g. communication) and that "there is no knowledge sharing" statement is not realistic. The highest level maturity is five and this model is CMM-based.

Training activities are placed in different levels. G-KMMM puts training goals in level 3 while KMCA set training goals in level 4.

As mentioned in 2. 7, organizational culture is critical for knowledge sharing and only learning organizations are able to increase maturity levels. For this reason, Hofstede's "power distance" and "uncertainty avoidance" dimensions are added to the assessment. KMCA and G-KMMM are focused on people and culture dimensions; however, Hofstede's power distance and uncertainty avoidance dimensions are not discussed.

3. 3. 4. 3. Step3: Adding Cultural Dimension

Combination of two models has provided certain advantages. On the other hand, there is still a gap (i.e. cross-cultural differences) to measure specific countries' organizational behavior. Hence, cultural analysis would need to be added to the proposed model which has been achieved via adding Höfstede's cultural dimensions. According to Brijbal, knowledge sharing operations are affected highly by cultural factors. The author made a study and the results show that Höfstede's high power distance and high uncertainty avoidance cultural dimensions impede knowledge sharing operations (Brijball, 2010).

3. 3. 4. 4. Step4: Combining Models and Developing Proposed Model

Table 3.10 shows the proposed model's levels and goals. The model starts with level 1 and highest level is level 5. The model has three key process areas namely, People/Culture, Process and Technology.

In their article *For performance through learning, knowledge management is the critical practice* which appeared journal Learning Organization edited by Firestone and McElroy, Gorelick and Tantawy-Monsou claim that "Knowledge Management framework integrates people, processes, and technology to ensure performance and learning for sustainable growth" (Gorelick & Tantawy-Monsou, 2005). Similarly, Servin (Servin, 2005) advocates that when thinking KM, three components ought to be highlighted, which are People, Process and Technology. Also, these three components have widely been used by other KMMMs namely *People, Process* and *Technology*. The

author compares these components to the legs of a "three-legged stool. Firstly, s/he has defined culture as values and behaviors. In addition, s/he underlines that KM is first and foremost a *People* issue. Secondly, s/he mentions *Process.* Organizations have to improve knowledge management by adjusting to the structure of their processes which may even necessitate changes within the organizational structure itself. Finally, technology is listed as the last component which is explained as a crucial enabler of knowledge management frequently by the author. Technology may help the organization connect people with information and other people but it is not a solution by itself (Servin, 2005).

KMCA's *Culture* was combined with G-KMMM's *People* key area and this new area has been named as "People/Culture". KMCA's *Lessons Learned* and *Expertise* was combined with G-KMMM's *Process* key area and this area has been named as "Process". Lastly KMCA's *Knowledge Documents* and *Data* was combined with G-KMMM's *Technology* and named as "Technology".

Table 3. 9 Combination Key Process Areas for proposed model

KMCA	G-KMMM
Expertise	People
Lessons Learned	Process
Knowledge Documents	Technology
Data	
Culture	

Combination	New Name
People, Culture, Lessons Learned, Expertise	People/Culture
Process	Process
Technology, Knowledge Docs, Data	Technology

Two models requirements are classified in a MS Excel document to create the new model's requirements and to prevent overlapping. Then, their levels and related KPA's (People, process and technology) are determined. Lastly, the combined model is created

by adding cultural dimension to its KPA level. Table 3.10 illustrates the combined model and its levels.

The combined model and its levels are discussed in *3.4. Definition of Processed Model Section.*

3. 3. 4. 5. Step5: Developing Assessment Tool

Performing the assessment of an organization's maturity level with a combined assessment tool was intended. Both models have assessment tools separately and they have been validated. KMCA model's assessment tool is subjective and has 102 questions which cover Culture, Expertise, Lessons Learned (LL), Knowledge Documents (KD) and Data dimensions. On the other hand, G-KMMM's assessment tool is objective and has 27 questions which cover People, Process and Technology areas. Totally, there were 139 questions and 8 different key process areas. However, asking too many questions will create loss of focus, and may cause some inconsistencies. To prevent this situation three steps are followed:

First Step

Question sets are captured using MS Excel and investigated. A questionnaire in Turkish is prepared by using the question sets of both models. The first questionnaire has 85 questions. It is observed that this measurement tool repeatedly measures the same facts. Consequently, the number of the questions was reduced.

Second Step

Questions with the same meaning are eliminated and applied a pilot study with the participation two public institution experts. With their feedbacks, question expressions were strengthened. Also, at this phase combined models' requirement items are defined (This topic is discussed in Section 4.2. Research Methodology).

Third Step

According to defined requirement items, a questionnaire is prepared. (Discussed in 4.2.2. Questionnaire preparation). All of items are matched with at least one question. As a result of doing this, the assessment tool's construct validity is provided.

For increasing robustness of this study, it is need to use different data collection techniques therefore, semi standardized interviews are prepared and conducted (Discussed in 4.2.3. Interview Preparation).

3.4. Definition of Proposed Model's Levels

As a capability maturity model, the proposed model guides organizations to establish and improve processes through five levels of maturity. Movement from each maturity level to the following level help the institutionalization of the organization causing to be more developed and organized in terms of knowledge management

3.4.1. Level 1: Initial

At first level (Initial), this is the most basic level of maturity. The organization has to define "knowledge" as valuable asset also past experiences and expert "knowledge workers" are important for People/Culture key area. On process dimension, the organization has to perform basic knowledge sharing activities. These activities do not have to be very systematic and complex at this level. Also there is no specific technology requirements expected in level 1. The G-KMMM has not specified goals for level 1, so that, default level is one for this model. Therefore, KMCA's requirements have been used for this level.

3.4.2. Level 2: Aware

The organization is aware of knowledge. Employees of the organization have intention to share knowledge and these sharing operations are fostered by management, (Mentioned in Chapter 2 Section 2. 9. 1. Knowledge Leadership) "general willingness to share" term is highlighted in KMCA Level 1 and management's incentives highlighted in level 2. G-KMMM also emphasizes "ready and willing to give advice or help on request" in level 2 culture area, however, "incentive systems" is placed in level 3 culture area. To avoid confusion, encouragement and incentive operations have been placed in level 2. Another requirement for this dimension is a perception that measures whether knowledge management is an important competence or not. Last requirement of culture is knowledge document that includes important "how to" in explicit form as mentioned in Chapter 2 Section 2. 3. 4. 1. Explicit Knowledge. On process side, the organization needs to create routine documents which related specific tasks, so that the organization needs to convert tacit knowledge to explicit knowledge. Also experienced employees' locations are known by the organization to consult their tacit knowledge. On technological dimension, the organization store data and knowledge documents in some fashion and there is at least a database system. At this level, the model measures only basic requirements of technology.

3.4.3. Level 3: Defined

The organization has shown institutionalization process. According to American Productivity and Quality Center (APQC) , level 3 is very important turning point in organization's way to KM maturity because of standardization process. On maturity scale, below level 3 means that the organization's knowledge processes are primarily ad

hoc and localized. On level 3 and above, the organization can integrate knowledge sharing and collaboration into the routine process (APQC, 2011). On People/Culture area, KM strategy, vision and organization-wide sharing operations have been highlighted by KMCA also mentioned in Chapter 2 Section 2. 8. 2. Networking and Collaboration. Individual KM roles and training activities are emphasized by Level 3 G-KMMM. The models differ in training activities, KMCA requires training in level 4 while G-KMMM requires in level 3. KM strategy and organizational learning must be placed in same level as mentioned in Chapter 2 Section 2. 7. 1. KM Strategy (Koenig & Srikantaiah, 2004). For this reason learning, strategy and vision are placed in this level. Moreover for providing organization-wide knowledge sharing, the organizations power distance and uncertainty avoidance (mentioned in 2. 8. 3. Organizational Culture and 3. 3. 3. Cultural Factors in Maturity) values has not to be too higher than 50 out of 100 points which impedes knowledge sharing operations (Brijball, 2010). On process key area, KM systems and activities have to improve the organization's performance. Best practices' and learned lessons' storing and retrieving are important. In other words, the organization shall implement past experiences to the future successfully. Categorization and taxonomies are also needed in this level for increasing performance. Lastly, KM related activities shall be adopted to organization's routine works. On technology key area, "centralization" term is significant, so that, it is needed to store and retrieve information in/from a KM system that reachable by most of units. At the previous level, technologic infrastructure presence is measured but at this level every unit of organization should see /store/ retrieve same information in same time. Information timeliness is highlighted by KMCA model and Bailey et.al. to provide true information at a time suitable for its users (Bailey & Pearson, 1983). Additionally, these software / systems provide an improvement to process quality. In other words, an organization may have investments in ICT's, but this does not mean the organization is reached the target to possess an effective and accessible system.

3.4.4. Level 4: Managed

Level 4 is coined "Managed" by these two models. On People/culture key area, organization should arrange regular knowledge sharing sessions in platforms that can be physical or digital. Regular sessions are important because every "knowledge worker" produce and integrate knowledge to build knowledge management cycle (McElroy, 1999). Management-level people should manage and assess knowledge sharing activities. Organizational strategy has to be emphasizing KM in multiple processes and special budget for KM improvement should be adjusted in this level. Employee's perception of KM systems is also important in this level. As mentioned in Chapter 2 Section 2. 7. 3. KM and ICT Systems, Debowski stated that good knowledge practices reach an effective ICT platform and employees can more easily seek, acquire or shake knowledge from the many sources that are available (Debowski, 2006). On process key area, measurement and usage of metrics is required in this way management-level employees are able to track and visualize knowledge sharing operations. Also KM Systems shall be utilized effectively. On technology key area, KM System shall be support every department of the organization. Another requirement of this level is about sharpness of meta-data which can be defined as "data about data". This is important

because it provides beneficial information about data such as where to find it, how it got, where it is, when it uploaded, who added it and other information about data. Lastly, Usefulness and ease of use of KM Systems is underlined in this wise employees' acceptance would be increased.

3.4.5. Level 5: Continuously Improved

The organization shares knowledge effectively in addition to it, improves all of processes, technologies and its culture progressively. At this level new business requirements and needs can be adapted to existing system (s) without making huge change

Table 3. 10 The Combined model Levels and KPA's

Maturity level	Key process areas		
	People	**Process**	**Technology**
1 Initial	•Acknowledgement of previous lessons learned and expertise (KMCA 1 LL and Expertise) •Organization consider that "knowledge is an asset" (KMCA 1- Culture)	•Little knowledge sharing (G-KMMM 1 Process)	N/A
2 Aware	•General willingness to share (KMCA 1 Culture) (G-KMMM 2 People) •Organization rewards activities associated with knowledge share (G-KMMM 3 People, KMCA 2 Culture) •KM is a key organizational Competence (G-KMMM- 2 Culture, KMCA 2 Culture)	• Routine task documentation (G-KMMM 1 Process) • Tacit knowledge and expert employees' knowledge are tracking (KMCA 2 Expertise and LL)	• Basic storage of explicit knowledge assets (G-KMMM 2 Technology)
3 Defined	•Knowledge sharing activities are taken place organization -wide (KMCA 3 – Culture) •The organization has a formal KM strategy and vision (G-KMMM 3 Culture) •There are training programs, campaign or workshops managed properly (G-KMMM 3 Culture, KMCA 4 Culture) •KM roles are defined (G-KMMM 3 Culture) •The organization takes advantage of experienced people (G-KMMM 3 Culture, KMCA 4 Culture) •The organization power distance and uncertainty avoidance Values (Hofstede) are not higher Than 50	•KM systems improve performance and quality (G-KMMM 3 Process) •Knowledge taxonomies exist (KMCA3 KD,LL) •KM related activities are part of the organization's routine work (G-KMMM 3 Culture, KMCA 3 KD,LL) •The organization implements Past experiences to the future (KMCA 3 Expertise- LL)	•Centralized databases or KMS exists (G-KMMM 3 Technology, KMCA 3 LL, Expertise, KD) •KM Systems/tools provides successful knowledge sharing operations (KMCA 3 Data,KD) •Technological infrastructure Provides information timeliness (KMCA 3 Data)
4 Managed	•The organization arranges knowledge sharing sessions (G-KMMM 4 People)	•Measurement, assessment or Benchmarking tools are used (G-KMMM 4 Process)	•KM system supports entire Organization (G-KMMM 4 People, Tech)
4	•The organization set a budget	•KM systems are effectively	•Meta-data is clear

Managed (cont'd)	specially for KM ・The organization arranges regular knowledge sharing sessions (G-KMMM 4 People) ・The organization set a budget specially for knowledge sharing (G-KMMM 4 People) ・KM incorporated into overall organization strategy (G-KMMM 4 People) ・Ease of use of KM systems (KMCA 4 LL, Expertise, Data)	utilized (G-KMMM 4 Process) Measurement, assessment or	(KMCA 4 Data, KD) ・Usefulness and ease of use of KMS and IS (KMCA 4 KD, Data)
5 Continuously Improved	・Knowledge sharing culture is exists and improves organization's performance (G-KMMM 5 Culture)	・Continuously improvement of knowledge sharing operations (G-KMMM 5 Process) ・Adaption to new business requirements G-KMMM 5 Process)	・Tools/systems are periodically reviewed and Improved (G-KMMM 5 Technology, KMCA 5 KD, LL, Data)

CHAPTER FOUR

RESEARCH METHODOLOGY

The previous chapter highlighted the properties of the proposed KMMM model. In this chapter, the assessment methodology is developed.

4.1. Case Study Research Method

In this section, quantitative and qualitative methods are examined and then the case study research method and its validity and reliability are discussed.

4.1.1. Quantitative and Qualitative Methods

There are two major research methods which are quantitative and qualitative methods. Quantitative research methods are developed in natural sciences to examine a natural phenomenon. Numerical models can be given as an example such as laboratory experiments, mathematical models and formal models. Qualitative research methods are used to study social and cultural phenomena. Examples of qualitative methods are case study research, action research, and grounded theory. Qualitative data sources include interviews and observation and questionnaires, documents and texts, and the researcher's impressions and reactions. Qualitative methods produce information only on the particular cases studied, and more general conclusions are only propositions.

4.1.2. Case Study

According to Yin, a case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident. (Yin, 1994).

Case study research can be based on any mixture of quantitative and qualitative approaches. Typically, it uses multiple data sources including two or more of the

following: direct detailed observations, interviews, and documents. In addition, case studies can involve single or multiple cases.

In this study, Yin's multiple case studies approach is followed. Figure 4.1 illustrates this approach. At the beginning, literature review is done and a combined model is developed. Then, in the cases selection phase, four of the public institutions' strategy development units (SDUs) and IT departments are selected. At the same time, different data collection tools are prepared (questionnaire and interview). Case reports and results are discussed in Section 4.3. While creating case studies, the researcher should use multiple data collection methods and multiple cases if it is possible because having multiple data sources enables triangulation (i.e. collecting information from a diverse range of individuals and settings, using a variety of methods) and cross-checking of the data achieved, which has provided greater support in order to reach more robust conclusions.

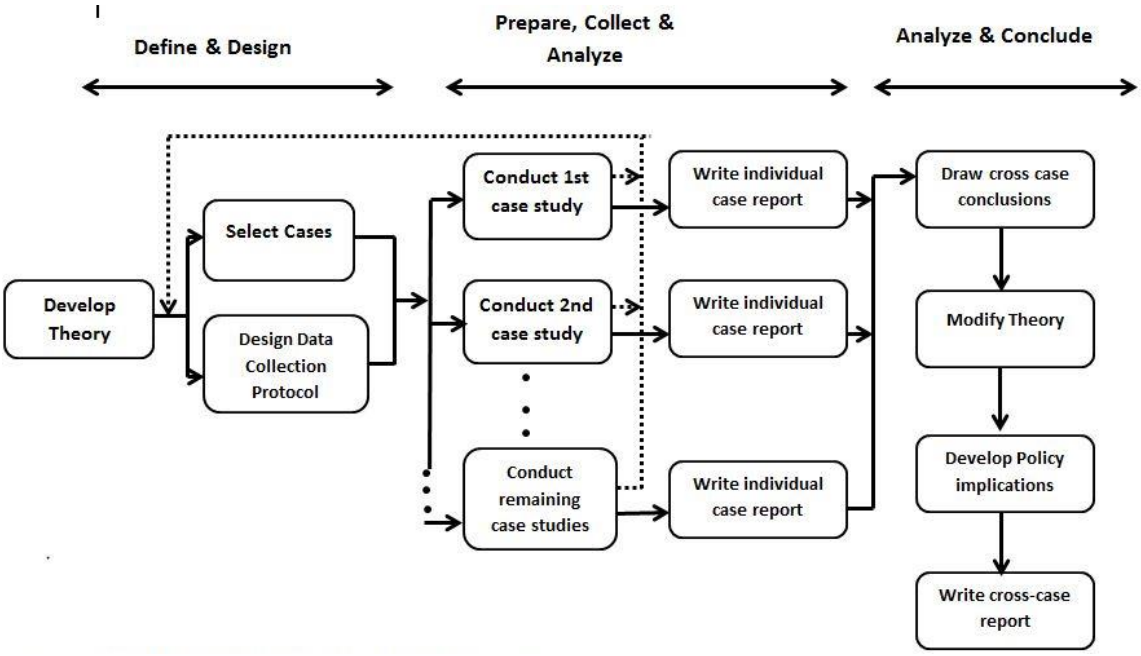

Figure 4. 1 Case Study Method (Adapted from (Yin, 1994)

4.1.3. Interviews

Interviews have commonly been defined as a conversation with a specific purpose and direction. The field notes of the interview process become a data source when documented. According to Berg, there are three types of interview research model, which are standardized interviews, unstandardized interviews and semi standardized interviews.

- Standardized interviews: These interviews generally use a structured schedule of interview questions. It is expected of interviewer to ask subjects to respond to each question. Researchers using this technique have to have solid ideas before interview and try to undercover these ideas during interview.
- Unstandardized interviews: In contrast to standardized interviews, this type of interviews does not utilize schedules and questions. In these interviews, interviewers must develop, adapt, and generate questions and follow-up probes appropriate to the given situation and the central purpose of the investigation.
- Semi-standardized interviews: This type of interview involves the implementation of a number of predetermined questions and/or special topics. These questions are typically asked to each interviewee in a systematic and consistent order, but the interviewers are allowed the freedom to digress. Consequently, the researcher has a question set and in conversation the topic may change slightly to collect another data. (Berg, 2000)

4.1.4. Validity, Reliability and Triangulation

According to Yin, four tests are used to test the quality of any social empirical research.

Construct validity sets up targeted operational measures for the concepts being studied. Internal validity establishes causal relations in certain condition leads to other conditions. External validity queries the study whether it can be generalized or not. Multiple cases are needed to measure external validity. Lastly, reliability tests the consistency of a study.

In this study, construct validity test is performed by using different data collection techniques such as questionnaire and interviews. Internal validity is tested by making different questions for the same item. External validity test is performed by preparing multiple case studies in different institutions. Lastly Cronbach's alpha is used for internal consistency and estimation of reliability of a test for sample of examinees.

Table 4. 1 Yin's Validity and Reliabity Tests

Test	Case Study Tactic	Phase
Construct validity	Multiple sources of evidence Establish chain of evidence Reviewing the report	Data collection

Table 4.1 Continued

Internal validity	Pattern matching	Data analysis
	Explanation building	
	Time series analysis	
External validity	Replication logic in multiple case Studies	Research design
Reliability	Case study protocol	Data Collection
	Case study database	

Source: (Yin, 1994), p. 33

According to Guion et. al., triangulaton is a qualitative research method which enables the researchers to check and ensure validity in their studies. There are five types of triangulation namely, data triangulation, investigator triangulation, theory triangulation, methodological triangulation and environmental triangulation. (Guion, Diehl, & McDonald, 2011). In this study, data triangulation method is used. Different type of data collection mehods are prepared and applied in order to increase the validity of this study.

In order to ensure construct validity, triangulation method is used, i.e. the data collected by different techniques namely, questionnaire from employees, interviews from managers or expert, and lastly strategic plans and performance programs. Additionally, while developing the assessment tool of model, each requirement is matched with an item and these items are tested with the questionnaire and interview.

So as to provide internal validity, the same type of organization is selected, and the model is applied in these organizations. The results and levels were compared and similar results are obtained.

Furthermore, the items that test same thing in this study are asked slightly different from without changing its fundamental meaning. These duplicated question items are analyzed by SPSS 22.0 software's. Cronbach's Alpha test results are presented in Appendix C.

To ensure external reliability, multiple case studies are designed and results are analyzed separately. Moreover, common features are presented in 5.5. Common Findings section.

For this study's reliability, Cronbach's alpha tool is used. This tool is developed by Cronbach in year 1951 (Cronbach, 1951) and used to determine the internal consistency or average correlation of items in a questionnaire tool to measure its reliability. (Santos, 1999) Cronbach's alpha basic statistical results and item total statistic are shown in Appendix C Section.

Table 4.2 shows used multiple case study tactics for this study which are adopted from Yin's study.

Table 4. 2 Used Case Study Tactics for this study (Adopted from (Yin, 1994)

Test	Case Study Tactic	Phase
Construct validity	Multiple sources of evidence • Interviews with multiple organizations and departments • Questionnaire with multiple organizations and departments • Investigation of Strategic plans of organization Establish chain of evidence • Requirements were matched with items.	Data collection
Internal validity	Pattern matching	Data analysis
External validity	Replication logic in multiple case Studies	Research design
Reliability	Cronbach's Alpha test	Data Collection

4.2. Research Methodology

4.2.1. Introduction

The proposed model has three KPA's and each level has requirements. There are three Key Process Areas (People, Process, and Technology) and five levels, namely, initial, aware, defined, managed and continuously improved. Totally, 34 goals are introduced to fulfill the related KPA's level. To increase the readability of requirements, a code is created which covers the KPA's short code (Peo: People, Pr: Process, T: Technology) and a number (i.e. Level 4 second process shows as 4pr2). Figure 4.2 illustrates these codes. These codes are in same order with Table 3.10.

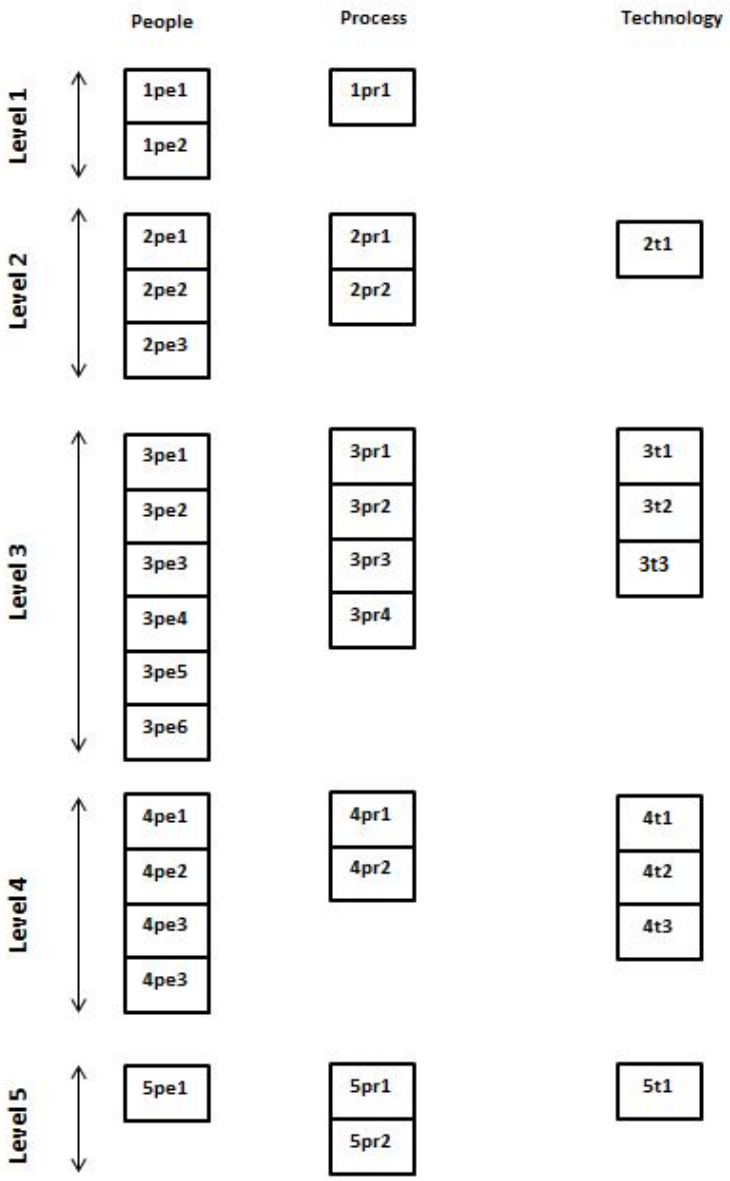

Figure 4. 2 Requirement items of Combined Model

These items are explained in this section.

People Key Area Items

1pe1 item measures "Acknowledgement of previous lessons learned and expertise".

1pe2 item measures whether the organization considers knowledge an asset or not

2pe1 item measures "General willingness to share knowledge"

2pe2 item basically measures incentives to share knowledge. 2pe3 item measures that organization considers knowledge as a key organizational competence or not.

3pe1 item measures organizational-wide knowledge sharing activities.

3pe2 item tries to find out the formal strategy and vision about KM.

3pe3 item is about training programs, campaigns or workshop availability.

3pe4 item find outs KM roles and positions in organization. As explained in 2.8.1 Emerging Knowledge Leadership section, the organization needs to appoint a manager for KM and define roles clearly about knowledge.

3pe5 item collects data about the organization's advantage policy about experienced people.

As explained earlier, 3pe6 item is related to Hofstede's two culture dimension: Power distance and Uncertainty Avoidance.

4pe1 item focuses on regular knowledge sharing sessions across organization.

4pe2 item is about availability of a special budget for knowledge sharing operations.

4pe3 is about strategy like 3pe2 but the point here is "incorporation into overall organization strategy".

4pe4 measures ease of use of KM systems in perception of "knowledge workers".

5pe1 is the highest item in people KPA. It focuses on a mainly knowledge sharing culture existence across the organization.

Process Key Area Items

2pr1 item measures routine task documentation as a process

2pr2 item focuses on knowing the location of expert employees.

3pr1 item generally measures the effect of KM systems on organization performance

3pr2 item focuses on knowledge taxonomy availability.

3pr3 item finds out whether KM related activities are part of the organization's routine work basis.

3pr4 item is about the implementation of the organization's past experience to the future.

4pr1 item is about measurement, assessment or benchmarking tool or operations availability.

4pr2 item is about the utilization of KM System in the organization.

5pr1 item focuses on "continuous improvement" of knowledge sharing operations.

5pr2 item measures the ability to adapt to new business requirements.

Technology Key Area Items

2t1 item finds out basically storage systems availability.

3t1 item is about the centralized database or KMS existence.

3t2 item measures the success of KM systems in terms of knowledge sharing.

4t1 item requires the entire organization support for KM system.

4t2 item is about clear and understandable meta-data objects.

4t3 item is the usefulness and ease of use of KM systems. 4pe4 item also focuses on ease of use and these two items have dependency.

5t1 item focuses on "continuous improvement" of technological tools/systems.

Research Steps:

Four steps are followed while developing the assessment tool of combined KMMM model:

Step1: Questionnaire preparation

Step2: Interview preparation

Step3: Dissemination of the questionnaire to employees and interview with selected management level individuals

Step4: Representation of findings

4.2.2. Questionnaire Preparation

In the previous chapter, it is explained that a new combined model is prepared. G-KMMM and KMCA models have their own question sets and they are open. KMCA model has 102 questions in its subjective question set and G-KMMM has 27 questions in its objective question set. However, developing a new questionnaire has been decided for two reasons. First, the models and their level requirements changed as mentioned in chapter three, using one of these question sets may not cover all KPA goals. Second, asking enough questions is needed without creating loss of focus by asking too many questions. In the new question set, multiple choices are provided as well as scale answers for easier analysis in the next step, which is using five Likert Scale (From Strongly Disagree to Strongly Agree). Also a sixth option is added for each question: "I

have no idea". This adaption principle presumably improved the quality of the attitude measures because it reduced the tendency for respondents to give "incorrect" answers when they lacked an opinion or enough knowledge to answer the questions posed. (Krosnick et. al, 2002). The focus here is not to force respondents to answer questions they do not know. This situation may reduce the number of answered questions, however it is likely to provide more reliable results. The answers to some questions are expected to be known by mid-level or high-level managers only.

Table 4. 3 Dissemination of Questions

Levels	No	People	Process	Technology
1	1	1Peo1 - 1	1Pr1 - 0	N/A
	2	1Peo2 -1		
2	1	2Peo1 -1	2Pr1 -2	2T1 -1
	2	2Peo2 -2	2Pr2 -1	
	3	2Peo3 -3		
3	1	3Peo1 -1	3Pr1 -1	3T1 -2
	2	3Peo2 -1	3Pr2 -1	3T2 -1
	3	3Peo3 -1	3Pr3 -1	3T3- 1
	4	3Peo4 -2	3Pr4 -1	
	5	3Peo5 -2		
	6	3Peo6 -5		
4	1	4Peo1 -2	4Pr1 -2	4T1 -2
	2	4Peo2 -1	4Pr2 -2	4T2 -1
	3	4Peo3 -1		4T3 -2
	4	4Peo4 -2		
5	1	5Peo1 -1	5Pr1 -1	5T1 -1
	2		5Pr2 -2	

Combined models (G-KMMM and KMCA) have separate question sets; however, some requirements are added and removed as mentioned in Chapter 3. Therefore, a new question set which covers all levels and its goals needs to be created.

In this survey, it is noticed that no questions have been prepared for 1Pr1 item. Because it only requires "little knowledge sharing", it is accepted that every public organization can fulfill this requirement; hence, no question is prepared for this item. At least one question is prepared for each other requirement.

In the next section, the questions are discussed.

People Key Area Questions

For 1pe1 item there is one question: "Knowledge is indispensable for performing routine tasks".

For 1pe2 item there is one question: "Organizational knowledge is recognized as essential for the long-term success of the organization".

For 2pe1 item there is one question "Employees are ready and willing to share knowledge".

For 2pe2 item there are two questions, the first one is about rewarding sharing activities. The second one is about the encouragement knowledge workers by management.

For 2pe3 item there are three questions. The first one is "KM is considered as organizational competence". The second one is "Experience in important while making decisions" and the last one is "Employees believe that KM is beneficial for the organization".

3pe1 item measures organizational-wide knowledge sharing activities. There is one question about that item: "knowledge sharing activities take place between different departments when required."

For 3pe2 item there is one question: Our institution has formal strategy and vision about KM.

For 3pe3 item there is one question: "There are KM training programs or awareness campaigns managed by top level management, i.e. introductory/specific workshops for contributors".

For 3pe4 item there are two questions. The first question is "Is there an authorized Knowledge Manager?" As explained in 2.8.1 Emerging Knowledge Leadership section, the organization needs to appoint a manager for KM and give roles clearly about knowledge. The second question is about roles in the organization related to knowledge.

For 3pe5 item there are two questions. The first one is "Our institution takes advantage of experienced people." Also another question asks convenience to find experienced people in case of need.

As explained earlier, 3pe6 item is related to Hofstede's two culture dimensions: Power distance and Uncertainty Avoidance.

For item 3Peo6 –this measures Hofstede's two cultural dimensions: Power Distance and Uncertainty Avoidance- five questions are taken from Pheng's "Hofstede Questionnaire. (Pheng & Yuquan, 2002). Totally, there are five questions for this item.

- Non-managerial employees' perception that employees are afraid to disagree with their managers (power distance).
- Subordinates' perception that their boss tends to take decisions in an autocratic or persuasive/paternalistic way (autocratic represents higher power distance).
- Employees' statement that they intend to continue with the company for two years at most or from two to five years.
- Rule orientation: agreement with the statement that "organization rules should not be broken even when the employee thinks it is in the company's best interest".
- Stress as expressed in the mean answer to the question, "how often do you feel nervous or tense at work?" (This question was adapted to KM : Employees feel nervous because of not reaching knowledge effectively)

For 4pe1 item, there are two questions. The first one is "Our organization arranges regular knowledge sharing sessions" and the second one is" While taking an important decision, the organization informs related stakeholders and announces that decision."

For 4pe2 item there is one question "There is a special budget for KM".

For 4pe3 item there are one question" KM-related activities incorporated into overall organization strategy".

For 4pe4 item there are two questions. The first question is "Managing KM System's parameters is easy" and the second one is "KM System enhances and makes it easy to find a document."

For 5pe1 item there is one question. "KM activities and its applications helped to create knowledge sharing culture."

Process Area Questions

For 2pr1 item, there are two questions. The first one is "Reaching / Taking advantage of knowledge documents is important for our organization". The second one is "Acquired experiences are recorded in some ways".

For 2pr2 item, there is one question: "In case of a need, there are some experienced people available."

For 3pr1 item, there is one question: "The organization loses workforce because of not effectively reaching relevant experts" (This question is asked negatively.)

For 3pr2 item, there is one question: "The institution categorizes and classifies knowledge assets owned and there is a standard for it".

For 3pr3 item, there is one question: "KM System is related closely with the organization's business processes."

For 3pr4 item, there is one question: "Our organization implements successfully past experiences to the future."

For 4pr1 item, there are two questions, the first one is: "Measurement, assessment and comparison activities are performed for KM related activities". The second one is "Knowledge processes are measured quantitatively."

For 4pr2 item, there are two questions. The first one is "Daily used programs/software solutions can find best practices or other experiences". The second one is "Knowledge creation and knowledge sharing processes are effectively implemented in our organization."

For 5pr1 item, there is one question "Knowledge sharing processes are improved continuously."

For 5pr2 item, there are two questions. The first one is "It is possible to add new categories to existing knowledge repositories". The second one is "Existing KM processes can be easily adapted to new business requirements".

Technology Key Area Questions

For 2t1 item there is one question "There is/are technology(ies) and infrastructure(s) in place that support KM."

For 3t1 item there are two questions. The first one is" Our institution has at least three of these tools: Forum, Portal, FAQ, distance/web based education, voting systems, special interest groups in portals, wiki, practice groups, messaging systems, Document management System (DMS), Decision Support Systems (DSS)" and the second question is "Our institution's technological infrastructure is used when finding relevant experienced people is inside or outside the organization"

For item 3t2 there is one question: "KM systems ensure success for departments of the organization."

For item 4t1there two questions. The first one is: "KM system supports entire organization" and the second one is "KM system is used by all of departments in the organization."

4t2 item question is about clearness and understandability of meta-data objects.

4t3 item is usefulness and ease of use of KM systems. 4pe4 item also focuses on the ease of use, these two items have dependency.

5t1 item focuses on “continuous improvement” of technological tools/systems.

4.2.3. Interview Preparation

For this study, semi-standardized interviews have been prepared for the top and middle level staff so that the participant can reflect his/her personal knowledge and interpretation. The model’s requirement items were determined in the previous section. Totally, 15 interview questions were asked to experts and managers. The questions and related items are discussed in this section. The questionnaire measures most of the items of this model whereas the interviews provide more limited data. It measures all of technology KPA items and some of people and process KRA items. As a result, it collects the information likely to be known by senior staff. The data is used for comparing and verifying to increase the robustness of the study.

The Interview contains these questions (related items shown in parentheses):

- Are there any measurement, assessment or comparison activities performed about KM’s current status?(4pr1)
- Is there official strategy and vision related to KM?(3pe2)
- Is there any authorized knowledge manager in the organization? (CKO rather than CIO) (3pe4)
- Is Data-driven decision-making process part of the work of several people or one person? (This question measures two things, the first thing is power distance –if all decisions taken by one person, this means high power distance- the second thing is data driven decision making so it is related to 3pr4 item)
- Do you think that the organization has enough technological infrastructure to manage knowledge? (3t1)
- Are KM Systems and KM processes revised continuously? And are they effectively adapted to new business requirements? (5pr1, 5pr2,5t1)
- Is there any section in year-and annual report related to KM? (4pe3)
- Is there any goal or indicator in this year’s performance program? (4pe2 and 4pe3)
- Is there any budget directly related to KM? (4pe2)
- Is this statement true for your organization “Employees are ready and eager to share knowledge”? (2pe1)
- Could you give information about your organization’s technological infrastructure? Sub-questions:
    - Is explicit knowledge basically stored in organization’s technological infrastructure? (2t1)
    - Do centralized databases or KMS exist in organization? (3t1)
    - “KM systems or tools provide successful knowledge operations” would you agree with this statement? (3t2)
    - Are your KM Systems useful? Are they easy to use? (4t3 and 4pe4)

- "While an important decision concerning your organization, relevant stakeholders are informed" would you agree with this statement? (3pe1 and UAC)
- "The organization plans regular knowledge-sharing meetings and training programs" would you agree with this statement? (regularity and continuity is related to 4pe1 item.)(Training programs are related to 3pe3 item)
- Are positive or negative past experiences stored and are they available for future usage? (Documentation is related to 2pr1 item, successfully future usage is related to 3pr4 item)

4.2.4. Dissemination the questionnaire to employees and interview with selected management level individuals

Selected institutions and their departments were visited by the researcher and a brief introduction was presented to the authorities. As a result of the recommendations, it was who will be appropriate to perform an interview was decided. Appointments were made to meet the expert and collect data. Before starting the interview, respondents were given a five minute introductory presentation about the aim and objectives of the thesis. The main reason for this was to make sure that the respondents are fully aware of the subject.

Each interview took 30-40 minutes. During this process, respondents were encouraged to express their ideas accurately as possible. After the interviews, the prepared questionnaire is disseminated online to non-managerial employees by creating its online version with the help of Middle East Technical University's Lime Survey tool. Data from interviews were ordered and edited in Microsoft Word and Excel software. Data from questionnaire is prepared for SPSS 22.0 Statistical Analysis software.

4.2.4.1. Assessment Criteria

Two types of data were collected for this study: Interview reports from semi-standardized interviews and Likert-type data from employee questionnaire. To enhance assessment process, all of requirements and goals of the model were matched with the item name.

4.2.4.2. Questionnaire Assessment Criteria

METU online survey tool produces values for each question from 0 to 5 (0: No opinion, 1: Strongly disagree, 2: disagree, 3: partially agree, 4: agree, 5: strongly agree).

Each question has six different facts namely, mean, mean value without "no opinion" choice, median, mode, bar chart and answer distribution table. Mean is the average. Mean without "zero value" is the mean result when no opinion values are eliminated.

This fact is important because it reveals the result of those who respond. Median is the middle score in a sequence. Mode is the most frequent score. Also bar charts for each question helped the researcher to see all of distribution of all choices visually. Lastly, the answer distribution table provides a general view with percent. Criteria to assess the results were determined. For this reason, following procedures are used:

- If mode value is 5, it is accepted that the organization "passed" in this item.
- If mode and median values are 4, the mean value without zero is investigated. If it larger than 3,3, it is accepted that organization passed in this item.
- If mode and median values are 3, bar chart and answer distribution table is investigated then decided (The values except 3 are examined in this case).
- If mode value is 0 (or one of mode values is 0), it means that respondents have no idea about this topic then it "fails".

4.2.4.3. Interview Assessment Criteria

Interview report files have been evaluated after interview date and stored in a Microsoft Excel file. For the semi standardized type of interviews are semi standardized, item related results and extra comments from interviewees were obtained. The data is prepared to compare with the questionnaire results.

CHAPTER FIVE

PRACTICES OF COMBINED MODEL: 4 CASES

The assessment framework presented in chapter 4 is applied to all four organizations.

In this study, four cases were selected in the Turkish public institutions. For anonymity, throughout the thesis, the organizations are represented with letters A, B, C and D. In this section more information on these cases is given. These four cases are summarized below in Table 5.1.:

Table 5. 1 Four Cases

Case	**Public/Private**	**Business Sector**	**Model Adopted on Department:**
Organization A	Public	Accounting/Finance	Strategy Development Unit (SDU) and IT Dept.
Organization B	Public	Law making	Strategy Development Unit (SDU) and IT Dept.
Organization C	Public	Strategy Dev. And Coordination of policies	Strategy Development Unit (SDU)
Organization D	Public	University	Strategy Development Unit (SDU) and IT Dept.

As explained in Table 5.1., this study focuses on Strategy Development Units and IT Departments in public institutions. These departments control and manage knowledge within the whole organization. Moreover, they decide on the related technology investments.

Totally 69 employees responded to questionnaire. Also, seven interviews were conducted with managers and experts from these four institutions.

The assessment framework presented in section 4.2.5 “Assessment Criteria” is applied to all four organizations. For each organization, a short background is given, then findings are presented and discussed, lastly level assessment is made.

5.1. Institution A

5.1.1 Background

Institution A is an important public institution in Turkey engaged in policy-making. It has distinctive experts, managers and civil servants in various departments. As the main target, Strategy Development Unit and IT Departments are selected. The survey is conducted in these two departments also two interviews were carried out, one with the department manager of the SDU and the other is a manager in IT systems. The survey data is collected by online survey tool and hard-copy material. Totally 15 respondents’ result are collected and evaluated. Table 5.2 shows the interviewee information and date.

Table 5. 2 Conducted Interviews in Institution A

Title	Department	Date
IT Manager	Strategy Development Unit	13.05.2014
Unit Manager	Strategy Development Unit	12.03.2014

The organization recently received ISO 27001 certificate and it changed some of its processes in positive manner.

5.1.2 Findings and Discussion

In this section, the findings from Institution A are presented. The data from questionnaire and interviews are used as the main source. The institution’s performance program and strategic plan documents available on the institution’s web site are used as supporting data. As a maturity model assessment, the items on which the organization failed are focused on.

Institution A showed stable results on people KPA. The results indicated that the organization reached the goals of level 1. Respondents denoted clearly that 2pe1 and 2pe2 items failed in level 2. 2pe1 item demonstrates that people in that department are reluctant to share data and they tend to hide from one another. IT Expert interviewee commented in this direction and Unit manager interviewee generalized this situation to all public institution. 2pe2 item is tested by two questions and both indicated that there are no incentives to share knowledge. Two questions are related to 2pr1 item; one of these questions indicated that documentation process is made successfully on a daily basis and the other question is about importance of knowledge documents. Both results

are positive. 2pr2 item shows that experts and tacit knowledge are located by the organization. On technology KPA, the organization fulfills the requirement with a high score.

As expected, the organization's numbers of achieved goals are decreased at Level 3 comparing to Level 2. On people KPA, 3pe4 item is failed. That means the organization has no specific position for KM. To support this, both interviewees stated that Turkish public institutions have no positions for KM. In section 2.8.1, it was mentioned there two roles are likely to be mixed; CIO and CKO. They expressed that CIO role is performed generally by Head of IT Department, but a manager who has only responsibility to knowledge infrastructure and communication is not available in this country. Another item, 3pe5 had also two questions, the first one passed (When required, the organization takes advantage of experienced people), but the second one failed which tests the ease of reaching experienced people by employees with a lower score. Hence, employees can find experts when needed but it is not so easy for them. 3pe6 item tests Hofstede's two dimensions namely, PDI and UAC. Points are lower than 50 so the organization succeeded in this item (PDI: 44,88 UAC: 40,67). The organization failed all of level 3 Process KPA items. The employees think that they cannot reach knowledge effectively, for this reason the organization loses labor force. This situation is related to 3pr1 item. 3pr2 item also failed which indicates whether knowledge taxonomies are available or not. According to employees, KM related activities are not part of the organization's routine work. 3pr3 item failed for this reason. 3pr4 item finds out whether the organizations past experiences are applied to future cases or not. This statement is rejected by all of respondents and it failed. On technology KPA, the organization succeeded in every item. They have centralized systems and these tools provide successful sharing operations.

When viewed Level 4 items, people KPA's 4pe1 item showed indecisiveness. There were two questions that measure "regular knowledge sharing sessions in the organization" and "sharing the taken decisions to relevant employees". The first question has more positive answers but the second one has less. As expected, public institutions organize meetings but employees indicated that the organization generally does not share decisions with every relevant people. Interviewees support this statement: the unit manager interviewee stated that in a public organization decision are taken by mid-level or top-level managers (there is a vertical hierarchy) and decisions may not be shared with every people. 4pe2 item finds out special budget availability for KM operations. 40 percent of employees have no idea. This situation is expected and this question is asked to interviewees. They pointed out two different types of budget but they are not directly about KM. The first one is training budget and both interviewees stated that it is very limited. The second one is equipment budget which covers computer, servers, software products and etc. As mentioned in the literature section, having adequate technological infrastructure does not provide successful knowledge sharing operations. They may help organizations but they do not guarantee effective KM. 4pe3 item asked only to managers by the help of the interviews. Incorporation into overall strategy of KM is the main requirement of this item. Two facts are tried to find out. "Does KM have a place in year-end annual report?" and "Is there any strategy and

vision about KM in the performance program?" Interviewees stated that there is no section or activity directly related to KM but there are training activities and infrastructure acquirement in this year-end annual report. Unit manager interviewee informed that there is no activity in performance program about KM; however, IT expert interviewee stated that there are some activities but they are only theoretical for this reason this item is failed. 4pe4 item tests the employees' perception to KM System tools' ease of use. None of the respondents marked positive options to the question "It is easy to manage knowledge-related systems parameters". The other question about this item (KM systems facilitates finding document process when it needed) has positive result. On Level 4 technology KPA, the organization succeeded in only 4t1 item which shows whether KM System supports the entire organization or not. Other technology items failed.

Level 5's first item, 5pe1 points out that the employees do not believe there is a sharing culture in their organization and the item failed. On the process side 5pr1 and 5pr2 items failed according to employees and interviewees. That means the organization cannot improve knowledge sharing operations and has deficiencies to adapt to new business requirements. 5t1 item also failed but the interesting thing here is that the unit manager interviewee stated that new software products are acquired/bought when the older one does not meet requirements. This statement conflicts with this model and CMMI. IT Expert interviewee reported that the organization had deficiencies in this subject (technological integrity) but ISO/IEC 27001 Information security standard has just been obtained, which will affect other technological processes positively.

5.1.3 Level Assessment

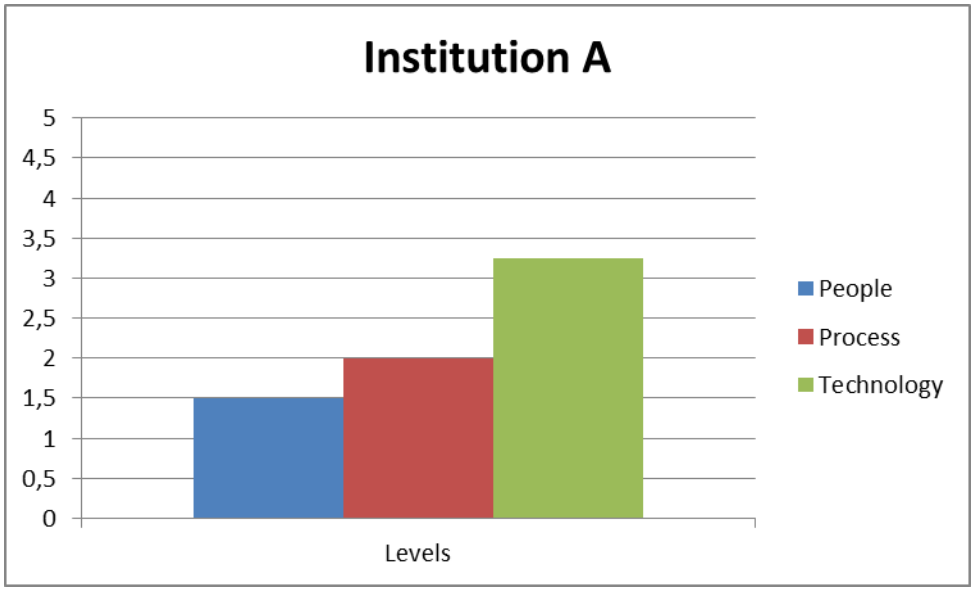

Figure 5. 1 Maturity Chart of Institution A

According to the assessment framework of this model, the institution A's maturity chart is depicted above in figure 5.1. The organization measured on people KPA as Level 1,5, on process KPA as Level 2 and on technology KPA as Level 3. Employees' reluctance to share knowledge is observed from the collected data. Additionally, incentives to share knowledge do not exist in the organization. For these reasons, the organization succeeded in two out of four Level 2 requirements and pointed 1,5 in this KPA. On the process side, the organization succeeded in Level 2 requirements; however, they failed all of Level 3 requirements. On technological side, the organization succeeded in all of Level 3 technology requirements. At level 4, only 4t1 passed and other three items failed. For this reason, the organization assessed on Level 3,25 on technology KPA.

5.2. Institution B

5.2.1. Background

Institution B is also a crucial public organization for the Turkish Republic engaged in policy-making. They take important decisions for Turkish people. It has distinctive experts, managers and civil servants in various departments. Two interviews were conducted with the heads of department of strategy development unit and an expert at the same department. Totally 23 returned questionnaire results are evaluated from the strategy development unit and IT department.

Table 5. 3 Conducted Interviews in Institution B

Title	Department	Date
Head of Department	Strategy Development Unit (SDU)	20.05.2014
Expert	Strategy Development Unit (SDU)	09.04.2014

5.2.2. Findings and Discussion

In this section findings from Institution B are evaluated. The data from questionnaire and interviews are used as the main source. The institution's strategic plan document (which is available on institution's web site) is used as a supportive data source. As a maturity model assessment, the deficiencies and the failure of each item are more focused on.

According to this model, the organization seems to succeed in all items up to Level2 except 2pe2 item; however, the score is not too low (Mean: 2,65, mode:3). Employees think that there are no incentive systems and the organization does not reward them when they share knowledge. It is expected because the institution is a public institution, but the head of department stated that there are campaigns which foster knowledge

sharing and innovation such as “I have a suggestion” project. With this project, employees are able to offer solutions via web portal and if the project is found beneficial, the employee is rewarded. This practice is uncommon in public organizations. On the process side, the organization produces documents on a daily basis (2pr1) and can locate expert employees(2pr2) and succeeds in Level 2 process KPA.

Most employees had no idea about the existence of a knowledge manager in their organization by answering “I have no idea” in the questionnaire, for this reason 3pe4 item failed. Expert interviewee reported that, there is not a position directly related KM in public institutions, so the head of department takes these roles. The head of department interviewee stated that, according to organizational structure the head of department is on top, and this task shall be made by head of department. Also, the interviewee underlined that this role is not officially given to somebody in public institutions in Turkey.

Power Distance score is higher and Uncertainty Avoidance score is lower than 50. (PDI: 63,15 UAC: 43,06). PDI score shows that employees are dependent and hierarchy is strong, superiors are often inaccessible and the ideal boss is a father figure. UAC score shows that employees are relatively stress-free. The employees stated that they intend to continue with the company for two or more years. This questions’ positive result is remarkable (for this question Mode:5, Median:5, Mean:4,65). This is positive for the organization. Retirement or transfer of experienced “knowledge workers” cause loss of intangible capital and organizational memory.

KM systems provide sharing processes (3pr1), yet it is shown clearly that in this organization knowledge taxonomies do not exists. This situation fails 3pr2 item.

On the technology side, it is seen clearly that the organization has centralized database systems such as forum and portal (3t1 item) and the KM System provides successful sharing operations in used departments. (3t2 item)

According to interviewees, the organization has a budget for hardware purchase and in-service training but there is no budget especially for KM. For 4pe3 item (KM is incorporated into overall organization strategy) both interviewees stated that KM activities have places in year-end annual report but not considered as “knowledge management”. In a similar manner, in performance plan KM is placed in different headings but not considered as KM. At Level 4 technology KPA, all of requirements are achieved, KM Systems support all of the departments (4t1 item), meta-data (As referred in sections 2.6.1 and 3.4.4 Level 4, meta data is data about data) is clear (4t2 item) and KM systems are useful according to employees.

Level 5 technology KPA’s requirement highlights “continuous improvement” on KM Systems. Interviewees expressed that existing systems are utilized and when the need arises, the new software is acquired. For this reason, 5t1 item failed.

5.2.3. Level Assessment

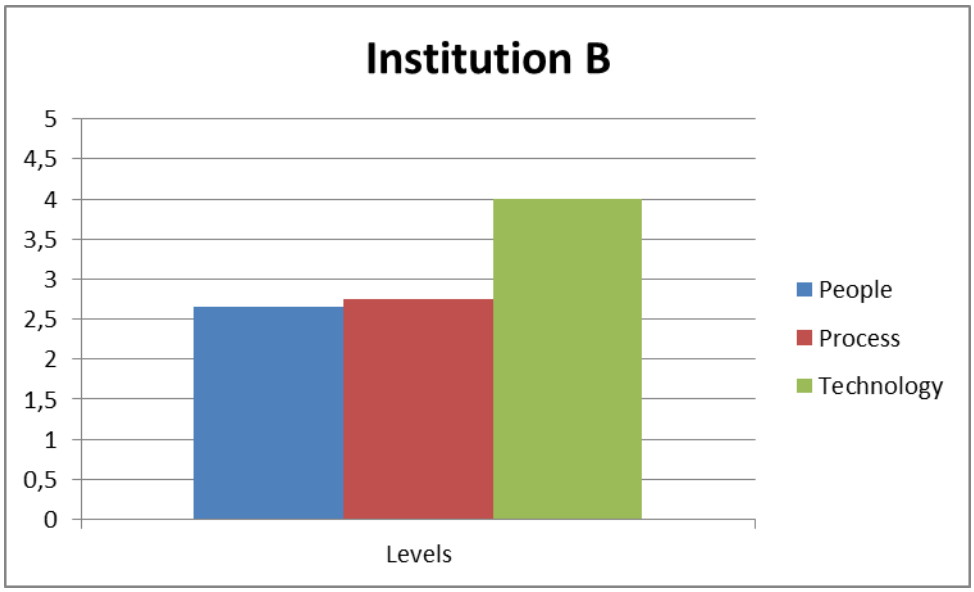

Figure 5. 2 Maturity Chart of Institution B

According to assessment framework of this model, the institution B's maturity chart is depicted above in Figure 5.2. The organization is measured on people KPA as 2,66 , on process KPA as 2,75 and on technology KPA as 4. The organization succeeds in Level 1 and Level 2 in people KPA. Also 4 out of 6 Level 3 requirements are achieved. However, KM roles and responsibilities are not defined in the organization. It is the requirement of 3pe4. Power distance score is higher than 50 so 3pe6 item failed and the maturity level of Institution B on people KPA is 2,66. On the process side, the organization succeeded in the first two levels, yet, at the level 3 it is observed that knowledge taxonomies do not exist. For this reason, 3pr2 item failed. On the technology side, the organization succeeded in all of four levels and failed at Level 5 so the organization measured as Level 4.

5.3. Institution C

5.3.1. Background

Institution C is Turkey's one of the new ministries and was reorganized in June 2011. Hence, it is a public institution engaged in policy making. Its vision is to be a leader and expertise Ministry, which designs the process of Turkish development in a holistic way. The organization has managers, planning experts, contracted employees and other civil servants. Totally 23 returned questionnaire results are evaluated from the strategy development unit and IT departments. In addition, an interview is conducted with an expert who is working in the strategy development unit.

Table 5. 4 Conducted Interview in Institution C

Title	Department	Date
Expert	Strategy Development Unit (SDU)	04.04.2014

5.3.2. Findings and Discussion

In this section the finding from Institution C are evaluated. The data from questionnaire and interviews are used as the main source. The institution's strategic plan document (which is available on institution's web site) is used for supportive data source. As a maturity model assessment, the deficiencies and the failure of each item are more focused on.

The organization succeeds in Level 1 requirements.

At Level 2 of people KPA, it can be seen that incentive systems and encouragement activities are missing. This fails 2pe2 item. Employees defined that knowledge is a key competence; however, the expert interviewee stated that employees tend to hide information rather than share it. This situation fails 2pe1 item. According to this view, managers do not foster employees to share knowledge and employees are unwilling to share knowledge and they only share knowledge when they have to. On the process side, it is observed that the organization succeeded in Level 2 process KPA requirements.

At Level 3, the organization shares knowledge intradepartmental way (3pe1 item). KM activities are part of formal strategy but the term KM is not used. In the year-end annual report, only hardware purchase and training activities exist and there are no headings directly related to KM (3pe2 item). The organization arranges trainings, campaigns and workshops for employees which are managed by top-level managers (3pe3 item). It is easy to find relevant experts when needed. On the process side, it is understood from the questionnaire results and interviews that reaching knowledge documents are important yet the organization is unable to document experiences acquired. The organization can find relevant experts when they needed. 3pr1 items results show that employees are stressed because they cannot reach knowledge effectively.

Power Distance score is just higher than 50 and Uncertainty Avoidance is lower (PDI: 52,63 UAC: 41,67). Employee Stability score shows that most of the employees are planning to stay in the institute. Also, employees rejected with a high ratio that "organization rules should not be broken even when the employee thinks it is in the company's best interest". This shows low UAC in the organization.

Centralized systems are found and they support all departments of the organization. Moreover, technical infrastructures are adequate (Forums, portal, internal messaging software and mail groups). According to employees, KM Systems provide successful knowledge sharing operations (3t2 item). Most employees think that software solutions

have the ease of use and the organization fulfills all of the level 4 technology requirements, but failed 5t1 item which measures periodic revision of tools of knowledge.

5.3.3. Level Assessment

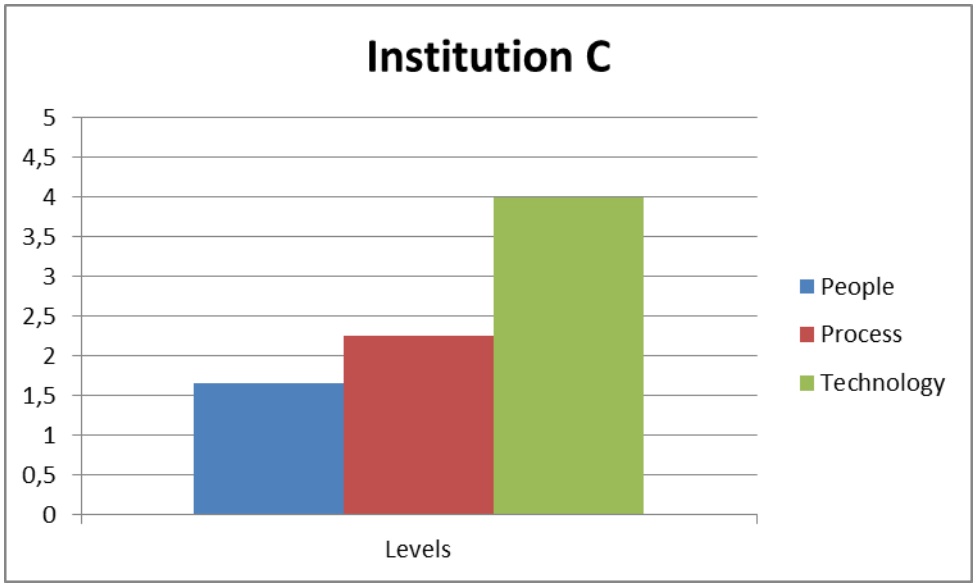

Figure 5. 3 Maturity Chart of Institution C

According to assessment framework of this model, the institution C's maturity chart is depicted above in Figure 5.3 The organization measured on people KPA as 1.66, on the process KPA as 2,25 and on the technology KPA as 4. On people KPA, non-existence of incentive systems for knowledge sharing failed 2pe2 item. Furthermore, managers do not encourage employees to share. For these reasons, the organization is not able to pass Level 2 on people KPA. On the process KPA, the organization owns experienced employees and takes advantage of them. Also, the organization is able to document routine tasks. However, they failed Level 3's three different items. Non-existence of useful knowledge taxonomies failed 3pr2 item. The institution does not record past experiences and does not implement them to improve future performance. (3pr1 and 3pr4). On technology KPA, the organization succeeded in all of four levels and fails at Level 5.

5.4. Institution D

5.4.1. Background

In this section the finding from Institution D, a state university, are evaluated. The data from questionnaire and interviews are used as main source. The institution's strategic

plan document and performance program (which are available on institution's web site) are used for supportive data source.

Institution D is one of Turkey's most competitive universities and currently has about 26500 students. This study focused on the Strategy Development Unit and IT Department and two interviews were conducted with the heads of these two departments.

Table 5. 5 Conducted Interviews in Institution D

Title	Department	Date
Head of Department	Strategy Development Unit (SDU)	12.05.2014
Head of Department	IT Department	14.05.2014

5.4.2. Findings and Discussion

In this section findings from Institution D are evaluated. The data from questionnaire and interviews are used as main source. The institution's strategic plan document and performance program (which are available on institution's web site) are used for supportive data source. As a maturity model assessment, the deficiencies and the failure of each item are more focused on.

The organization succeeds in all of Level 1 requirements.

On people KPA, employees think that managers do not foster knowledge sharing activities and incentive systems do not exists. Additionally, the interviewee (Str. Dev. Dept.) highlights that knowledge sharing willingness is generally low in public institutions because employees want to be special. Questionnaire results show that employees mostly "partially accept" this statement. For these reasons 2pe1 and 2pe2 items failed. KM is accepted as an organizational competence by all organization members.

At level 3, the organization performed better, employees can attend courses, conferences and workshops on campus easily by taking the advantage of being in an educational institution. Unlike other institutions, the university has some goals related to KM in the strategy plan between 2011 and 2016. Additionally, in activity report for year 2013, there are two activities related to KM. Yet, some deficiencies still exist. Employees claimed that the institution does not take advantage of its experienced employees (3pe5 item). Power Distance and Uncertainty Avoidance scores are higher than 50 (PDI: 78 UAC:55,66). Employees have a perception that they are afraid to disagree with their managers. UAC score's reliability is low because of low answer rate (approximate 45 percent of respondents selected "no opinion" choice).

At level 4, the organization arranges regular meetings and interdepartmental sharing activities take place.

On the process KPA, Head of IT Department stated that they are working on a system to store best practices. This project is included in the 2011-2016 strategy plan. Basically IT department has a wiki and how-to catalog about IT-related operations to all of the academic and administrative departments. On the other hand, employees stated non-existence of recording useful experiences. Also, they have various software solutions so it is hard to prepare knowledge taxonomies. To avoid these problems, the university is planning to develop a more centralized system.

Technologically, the university has numerous software solutions that support the entire campus. Nevertheless, the general perception of the organization's technological infrastructures is their difficulty and complexity. This situation is reflected in 4t3 item. The software group that consisted of IT Experts developed most of the software solutions. Outsourcing rate is relatively lower than other the three organizations and this team periodically reviews existing systems.

5.4.3. Level Assessment

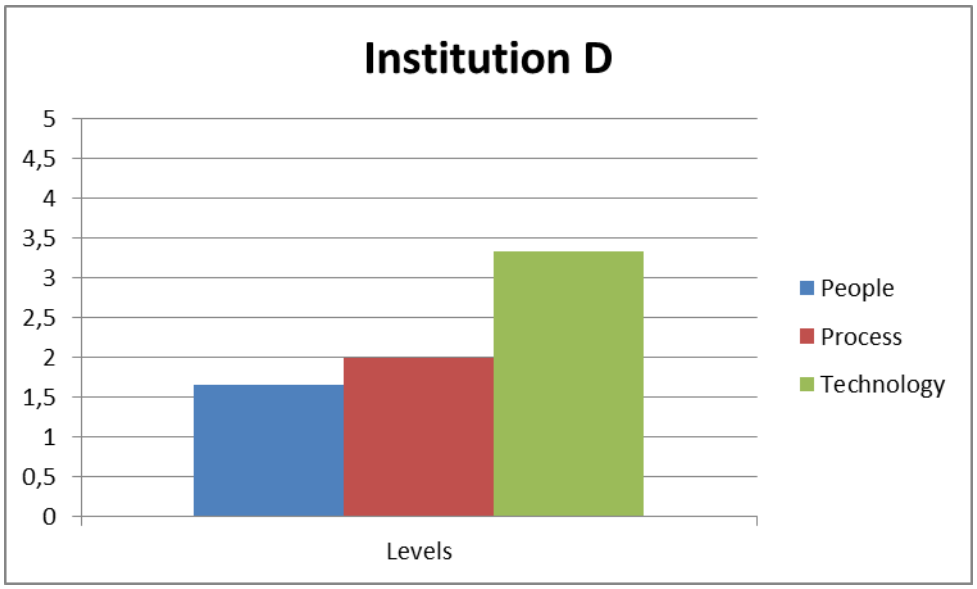

Figure 5. 4 Maturity Chart of Institution D

According to the assessment framework of this model, the institution D's maturity chart is depicted above in Figure 5.4. The organization measured on people KPA as 1.66, on process KPA as 2 and on technology KPA as 3.33. On people KPA, the non-existence of incentive systems for knowledge sharing failed 2pe2 item. Also, the managers do not encourage employees to share. For these reasons, the organization is not able to pass Level 2 on people KPA. On process KPA, the organization owns experienced employees and takes advantage of them. Moreover, the organization is able to document routine

tasks. However, they failed all requirements of Level 3; therefore, the organization measured as 2 on process KPA. On technology KPA, the organization succeeded in all of Level 3 requirements and one Level 4 requirement. Meta-data on KM Systems are clear (4t2 item); on the other hand, KM Systems are complex and hard to use according to the employees (4t3 item). An integrated system does not support all of the departments (4t2 item). Consequently, the organization measured as 3,33 on technology KPA.

CHAPTER SIX

CONCLUSIONS

This thesis has aim at developing a KMMM which can be applied in any public institution regardless of the sector. Moreover, this thesis has developed a model and applied it in four public institutions in Turkey. In addition, the results have been comparatively analyzed and the reasons why this analysis has been carried out have been laid out.

Unlike those institutions which enforce policies, it is difficult to arrive some conclusions in policy-making institutions that have to use knowledge management. For example, policy-making institutions need a variety of indicators to find out how many patients have been treated or how many kilometers have been traveled. As a result, moving from one stage to another in a maturity model (i.e. laying out the requirements as targets) is necessary.

This chapter firstly presents an overview of this research. Secondly, finding and results are discussed. Thirdly, the limitations of this research are presented. Lastly, the future works about this research topic is referred.

6.1. Summary of Work Done

This thesis aimed at developing an integrated Knowledge Management Maturity Model (KMMM) by studying the existing models. Therefore, the literature is reviewed extensively and presented in Chapter 2. Also, in the same chapter twenty different KMMM's were introduced. Then, the selection criteria are determined and two of the suitable models were selected. For such study, cultural factors could not be ignored so Hofstede's two cultural dimensions are selected and added to this model in Chapter 3. The developed model has three Key Process Areas namely, People, Process and Technology. The model's developed assessment tool was designed in Chapter 4. The assessment tool is applied in four of Turkish public institutions' especially strategy development and IT departments. The results are presented and discussed and the model's validity and reliability are tested in Chapter 5.

6.2. Findings of Study

6.2.1. Common Findings

The results of the combined model have been presented in the previous section. Interviewees and employees opinions are collected analyzed and the results are presented. Also, the strategic programs and year-end annual reports of each organization are examined. In the following section, common features are presented:

- When the maturity levels of the organizations in discussions sections are reviewed, it can be seen that the selected public organizations' technology KPA maturity level is higher than other two KPAs because technology systems or infrastructures are tangible and they can be obtained by having budgets. Year-end annual reports show that KM-related budgets are available for technology investments and training activities.
- There are no defined roles in Turkish public institutions for only KM. Chief Knowledge Officer (CKO) role is not heard by interviewees. CIO role is generally assigned to Head of IT Departments, yet there is no position officially.
- Knowledge-sharing culture does not seem to exist in the investigated Turkish public institutions. Employees tend to hide knowledge rather than share it. Managers generally do not encourage employees to share knowledge.
- Vertical hierarchy structure is observed so communication between managers and employees is lower. High power distance score impedes knowledge sharing (Related questions' results show that). For all of these reasons it is hard to create a sharing culture.
- Meetings take place in these public institutions and can be considered as knowledge sharing operations.
- Institutions generally do not store and utilize past experiences. Searching the same results decreases the effectiveness of organizations.
- On process KPA, all of the institutions measured lower than Level 3. This situation can be interpreted as the public institutions have written rules and they do not go outside the rules.
- The concept of knowledge taxonomies is new for the Turkish public institutions and its usage is limited.
- There are sufficient budgets for training activities and most of the managers attend these activities. On the other hand, their efficiency and effectiveness are not generally measured.
- Institutions invest in technology like PCs, servers, infrastructures whereas they do not invest in people skills generally. Employees attend trainings so it may be accepted as investing people skills; however, these activities cannot be converted to organizational memory as they do not know how to share knowledge or they are unwilling to do so.

- Uncertainty avoidance scores show that employees generally plan to stay in the organization. It can be interpreted as institutions have less risk to lose its knowledge workers.
- Institutions know the locations of expert people in case of a need; however, in practice they faced some problems to take advantage of their experience. Also, technological infrastructures are not used for this purpose usually.
- Four of these institutions' managers or experts noticed that the numbers of data-driven decisions increased in recent years visibly. The numbers of intuitive decisions decreased.
- Measurement, assessment or benchmarking for knowledge-sharing processes are not observed but institution B and institution D added these activities in their strategic plans.

6.2.2. Comparative Analysis

In the previous section common features have been listed. In this section, the differences between the institutions are presented.

- Institution B measured over Level 2 on people KPA because of manager incentives to knowledge and willingness of their employees. Also, they can present their innovative ideas to management level and if the idea is found beneficial, it is used for the organization.
- Results show that Institution B and Institution D reached level 4 on technology KPA. The other two organizations failed 4t2 and 4t3 items, which means that meta-data usage is limited/not clear and employees think that KM-related technologies are not ease-of use and their usefulness is low.
- Institution A and Institution D measured as the same level on process KPA (2,0). Institution C added some activities related to KM processes to their daily work (3pr3). Institution B measured as 2,75 because they succeeded in all of Level 3 items except 3pr2 which points out taxonomies and categorization.

6.3. Limitations of Study

There are several limitations of this research. At the very beginning of the study, only the questionnaire method was planned to be used. However, since the number of the respondents was limited which caused a problem in the robustness of the study, observations, documents of institutions such as strategic plans and performance plans and interviews were used. Furthermore, the sample size is limited because of the reluctance of the employees in the public institutions to fill surveys. Results and

discussions are made with the help of collected data so they cannot be generalized. To cope with this situation, multiple case studies are designed and applied.

To measure the cultural dimensions, more question items for more robust results may be needed because the assessment tool used in this study only measures related cultural dimensions and its number is limited.

6.4. Future Works

- Combined model needs more samples to measure knowledge management maturity.
- For comparison results, the model can be applied in private sector organizations. In addition, it can be applied in different countries to see the international differences.
- This study focused on only two departments of public institutions. Yet, different case studies can be designed to include organization-wide responses.
- Different cultural dimensions and KPA's can be added.
- Interviews can be conducted with more managers to acquire more robust results.

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APPENDICES

APPENDIX A Main Survey Items (Turkish)

Bu anket, ODTÜ Enformatik Enstitüsü'nde yürütmekte olduğum yüksek lisans çalışması kapsamında, kurumunuzda Bilgi Yönetimi Olgunluğunu ölçmeyi amaçlamaktadır. bilgi yönetimi sistemi (BYS) örnekleri arasında mesajlaşma sistemleri, doküman yönetim sistemleri, karar destek sistemleri, modelleme ve simülasyon sistemleri, uzaktan/elektronik eğitim sistemleri ve web portalı sayılabilir. Bilgi Yönetimi (BY) kurum içi veya kurum dışı kaynaklardan bilginin yakalanıp-edinilip, tasnif edilmesi, stoklanması, yorumlanmak üzere ilgili yerlere gerekli zamanlarda dağıtılması, sahip olunan bilginin güncellenmek üzere gözden geçirilmesi, her şeyden önemlisi bunlardan yeni bilginin üretilmesi sürecidir. Bilgi, belgesiz örtük bilgi (düşünce ve fikir) veya açık yazılı bilgi (kitap ve doküman) olabilir. Kurumda bilgi, belgeler, arşiv, yenilikler, fikir, haber, patent, istatistik gibi farklı formlarda olabilir. Bilgi Yönetimi Sistemleri (BYS) kurumların deneyimleri, belgeleri, fikir, bilgi ve bilginin diğer formlarını edinme, saklama, paylaşma ve uygulama için kullandıkları Bilişim Sistemleri (BS) ve Bilgi ve İletişim Teknolojileri (BİT) tabanlı araçlardır. BYS'de BİT ile bilgiye daha kolay ve daha hızlı erişmek mümkün olmaktadır. BYS geçmiş sorunların çözümlerini saklayarak, benzer problemler ortaya çıktığında yönetici ve çalışanlara yol göstermek ve karar destek için kullanılma yanında şirketin geçmiş ürün ve hizmetlerinden edindiği deneyime bakarak yenilik yaratmak için de kullanılabilir. Bilgi Deposu terimi, bilginin tutulduğu veri tabanları ya da veri ambarlarını işaret eder. Bu veriler kurumun sahip olduğu bir yazılım tarafından işleniyor/güncelleniyor olabilir.

Bu çerçevede, aşağıdaki soruları cevaplamak için ayıracağınız 15 dakikalık zamanınız için şimdiden teşekkür ederim.

	Kesinlikle Katılmıyorum	*Katılmıyorum*	*Kısmen Katılıyorum*	*Katılıyorum*	*Kesinlikle Katılıyorum*	*Bilgim / Fikrim Yok*
Kurumsal bilgi, kurumumuzun vade başarısı için gerekli olarak görülmektedir	○	○	○	○	○	○
Kurumumuzda yetkilendirilmiş bilgi yöneticisi vardır	○	○	○	○	○	○
Kurumumuzun resmi bir bilgi yönetimi stratejisi ve hedefi	○	○	○	○	○	○

vardır						
Kurumumuzda bilgi yönetimi farkındalık eğitimleri verilir	○	○	○	○	○	○
Kurumumuzda düzenli olarak bilgi paylaşımı toplantıları yapılır	○	○	○	○	○	○
Bilgi yönetimi için özel olarak ayrılmış bir bütçe vardır	○	○	○	○	○	○
Bilgi yönetiminin organizasyondaki durumuyla ilgili kıyaslama, ölçme ve değerlendirme yapılır	○	○	○	○	○	○
Deneyimlerin bulunduğu bilgi deposuna yeni kategoriler eklemek mümkündür	○	○	○	○	○	○
Kurumumuzda gerekli durumlarda iletişime geçilebilecek deneyimli kişiler mevcuttur	○	○	○	○	○	○
Kurum içinden ve dışından daha deneyimli kişilere erişmek için kurumumuzun bilgi yönetimi sistemi kullanılabilir	○	○	○	○	○	○
Kurumumuz bünyesinde belirtilen bilgi yönetim sistemi araçlarından en az 3 tanesi bulunur(forum, SSS, Web tabanlı eğitim/uzaktan eğitim, oylama sistemi, ilgi toplulukları, wiki, pratik toplulukları, mesajlaşma sistemleri, doküman yönetim sistemleri, karar destek sistemleri, modelleme ve simülasyon sistemleri, web portalı)	○	○	○	○	○	○
Kurumumuza gelen yenilikler ile ilgili eğitim programları oluşturulur ve uygulanır	○	○	○	○	○	○
Kurumumuzda bilgi paylaşımını teşvik etmeye yönelik bir ödüllendirme mekanizması vardır	○	○	○	○	○	○
Bilgi süreçleri sayısal (nicelik) olarak ölçülür	○	○	○	○	○	○
Yaşanan tecrübelerin kayıt altına alınması kurumumuzda bazı grupların/kişilerin sorumluluğudur	○	○	○	○	○	○
Günlük kullanılan programların içinde geçmiş iyi ve kötü deneyimleri bulmaya yarayan kısımlar vardır	○	○	○	○	○	○

Bilgi Yönetim Sistemi tüm kurumu genel olarak kapsar						
Bilgi yönetimi sistemi iş süreçlerimizle yakından ilişkilendirilmiştir						
Kurumumuzda bilgi yönetim sistemlerinin kullandığı bilgi deposu güncel tutulur						
Kurumumuzun yaşadığı tecrübeler kayıt altına alınır						
Bilgi Yönetimi Sistemi ve araçları belirli aralıklarla gözden geçirilir/iyileştirilir						
Bilgiye etkin şekilde erişilemediği için iş gücü kaybı yaşanır						
Bilgi yönetimi önemli bir kurumsal yetkinlik olarak kabul edilir						
Kurumumuz çalışanları bilgiyi paylaşmaya hazır ve isteklidir						
Bilgi yönetimi uygulanması, kurumumuzda bilgi paylaşımı kültürünün oluşmasını sağlamıştır						
Kurumumuz deneyimli çalışanlarından faydalanmaktadır.						
Karar verme sürecinde deneyim önemlidir						
İhtiyaç halinde konu ile ilgili uzman bulmak kolaydır						
Bilgi yönetim sistemindeki profilin parametrelerin yönetimi kolaydır						
Kurum içi iletişimi sağlayan yazılımları kullanmak kolaydır						
Yöneticilerimiz kurum içinde bilgi paylaşımını teşvik eder						
Çalışanlar bilgi yönetiminin kurumumuza fayda sağlayacağına inanır						
Var olan bilgi yönetimi süreçleri yeni iş gereksinimleri için kolay uyarlanabilir						
Kurumumuz geçmiş deneyimlerini başarıyla geleceğe uygular						
Üst veriler (Meta-veriler) açık ve anlaşılabilirdir						
Karar destek araçlarını kullanmak kolaydır						

Bilgi dokümanlarına başvurmak/faydalanmak kurumumuz için önemlidir	○	○	○	○	○	○
Kurumdaki yazılımlar aranılan dokümanın bulunması işlemini kolaylaştırır	○	○	○	○	○	○
Yönetici olmayan personel müdürüyle / yöneticisiyle fikir ayrılığı yaşamaktan çekinir	○	○	○	○	○	○
Çalışanlar yöneticilerin otokratik (eleştirilmez, yargılanmaz) kararlarlar aldığına dair bir fikre sahiptir.	○	○	○	○	○	○
Kurumumuzda uygulanan kurallar, kuruma zarar verse dahi çiğnenmemelidir.	○	○	○	○	○	○
Bu kurumda en az 2 yıldır çalışıyorum ve uzun süre çalışmayı planlıyorum	○	○	○	○	○	○
Kurumumuzu ilgilendiren önemli bir karar alınırken ilgili kurum paydaşlarıyla paylaşılır	○	○	○	○	○	○
Bilgi, kurumumuzdaki rutin görevi gerçekleştirmek için vazgeçilmezdir	○	○	○	○	○	○
Kurumumuzun sahip olduğu bilgiler açık bir şekilde kategorilere ayrılmıştır ve belirli bir standardı vardır	○	○	○	○	○	○
Bilgi yönetim sistemi kullanıldığı birimlerde başarı sağlar	○	○	○	○	○	○
Bilgi yönetim sistemi kurumumuzdaki tüm birimler tarafından kullanılır	○	○	○	○	○	○
Kurumumuzda bilgi üretim ve paylaşım süreçleri etkin olarak uygulanmaktadır	○	○	○	○	○	○

APPENDIX B: THE DESCRIPTIVE STATISTICS

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
cinsiyet	69	1	2	1,52	,503	,253	-,089	,289	-2,052	,570
soru1	69	0	5	4,16	1,024	1,048	-1,685	,289	3,802	,570
soru2	69	0	5	3,09	1,660	2,757	-,698	,289	-,625	,570
soru3	69	0	5	3,43	1,194	1,426	-1,015	,289	1,067	,570
soru4	69	2	5	3,72	,820	,673	,062	,289	-,717	,570
soru5	69	0	5	2,46	1,596	2,546	-,312	,289	-1,124	,570
soru6	69	0	4	2,32	1,207	1,456	-,387	,289	-,452	,570
soru7	69	0	5	3,29	1,436	2,062	-,806	,289	-,305	,570
soru8	69	2	5	3,99	,831	,691	-,447	,289	-,380	,570
soru9	69	0	5	2,71	1,554	2,415	-,491	,289	-,741	,570
soru10	69	0	5	3,99	1,278	1,632	-1,497	,289	2,307	,570
soru11	69	0	5	3,52	1,119	1,253	-,898	,289	1,417	,570
soru12	69	0	4	2,01	1,022	1,044	,056	,289	-,149	,570
soru13	69	0	5	2,28	1,371	1,879	-,306	,289	-,791	,570
soru14	69	0	5	2,71	1,456	2,121	-,269	,289	-,733	,570
soru15	69	0	5	2,17	1,248	1,558	,081	,289	-,452	,570
soru16	69	0	5	3,25	1,519	2,306	-,795	,289	-,247	,570
soru17	69	0	5	3,20	1,008	1,017	-,423	,289	,684	,570
soru18	69	0	5	3,10	1,477	2,181	-,744	,289	-,178	,570
soru19	69	0	5	2,81	1,417	2,008	-,486	,289	-,775	,570
soru20	69	0	5	2,71	1,476	2,179	-,468	,289	-,623	,570
soru21	69	0	5	3,35	1,433	2,054	-,857	,289	,159	,570
soru22	69	0	5	3,67	1,256	1,578	-1,536	,289	2,372	,570
soru23	69	1	5	3,04	1,006	1,013	,000	,289	-,378	,570
soru24	69	0	5	2,80	1,183	1,399	-,471	,289	,477	,570
soru25	69	0	5	3,41	1,075	1,156	-,881	,289	,993	,570
soru26	69	0	5	4,07	1,298	1,686	-1,799	,289	2,937	,570
soru27	69	2	5	3,25	1,090	1,188	,260	,289	-1,256	,570
soru28	69	0	5	2,41	1,354	1,833	-,490	,289	-,281	,570
soru29	69	0	5	3,33	,980	,961	-1,108	,289	2,300	,570
soru30	69	0	5	3,48	1,133	1,283	-,914	,289	,646	,570
soru31	69	0	5	3,57	1,194	1,426	-1,440	,289	2,584	,570
soru32	69	0	5	3,07	1,298	1,686	-1,010	,289	,377	,570
soru33	69	0	5	2,88	1,255	1,575	-,557	,289	,631	,570
soru34	69	0	5	2,52	1,632	2,665	-,395	,289	-,930	,570
soru35	69	0	5	2,42	1,538	2,365	-,220	,289	-,778	,570
soru36	69	0	5	3,84	1,171	1,371	-1,548	,289	3,117	,570
soru37	69	0	5	3,29	1,330	1,768	-,981	,289	,633	,570
soru38	69	0	5	2,57	1,586	2,514	-,134	,289	-,976	,570
soru39	69	0	5	2,32	1,430	2,044	-,027	,289	-,757	,570
soru40	69	0	5	1,91	1,292	1,669	,588	,289	-,403	,570
soru41	69	0	5	3,93	1,365	1,862	-1,725	,289	2,713	,570
soru42	69	0	5	2,84	1,481	2,195	-,696	,289	-,506	,570
soru43	69	0	5	3,72	1,371	1,879	-1,353	,289	1,345	,570
soru44	69	0	5	2,49	1,400	1,960	-,250	,289	-,506	,570
soru45	69	0	5	3,97	1,294	1,676	-2,039	,289	4,183	,570
soru46	69	0	5	2,88	1,471	2,163	-,651	,289	-,333	,570
soru47	69	0	5	2,88	1,219	1,486	-,775	,289	,897	,570
soru48	69	0	5	2,38	1,285	1,650	-,147	,289	-,541	,570
soru49	69	0	5	2,72	1,494	2,232	-,546	,289	-,573	,570
soru50	69	0	5	3,65	1,281	1,642	-1,645	,289	2,630	,570
soru51	69	0	5	3,77	1,073	1,151	-1,430	,289	3,217	,570
Valid N (listwise)	69									

Figure B. 1 The Descriptive Statistics

APPENDIX C Cronbach's Alpha Results

In this section Cronbach's alpha for reliability test are figured.

Case Processing Summary

		N	%
Cases	Valid	69	100,0
	Excluded[a]	0	,0
	Total	69	100,0

a. Listwise deletion based on all variables in the procedure.

Figure C. 1 Case Processing Summary

Reliability Statistics

Cronbach's Alpha	N of Items
,929	51

Figure C. 2 Reliability Statistics

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
soru1	153,20	951,194	,486	,928
soru2	154,28	950,850	,286	,930
soru3	153,93	959,598	,296	,929
soru4	153,64	963,676	,364	,929
soru5	154,90	939,416	,419	,928
soru6	155,04	946,542	,470	,928
soru7	154,07	933,186	,543	,927
soru8	153,38	972,591	,186	,929
soru9	154,65	949,760	,321	,929
soru10	153,38	951,768	,374	,928
soru11	153,84	939,930	,608	,927
soru12	155,35	960,701	,334	,929
soru13	155,09	953,551	,325	,929
soru14	154,65	942,642	,427	,928
soru15	155,19	956,949	,316	,929
soru16	154,12	949,075	,337	,929
soru17	154,16	942,577	,635	,927
soru18	154,26	932,225	,538	,927
soru19	154,55	926,163	,635	,926
soru20	154,65	923,083	,643	,926
soru21	154,01	981,926	-,012	,932
soru22	153,70	941,450	,517	,927
soru23	154,32	954,779	,436	,928
soru24	154,57	938,867	,588	,927
soru25	153,96	947,925	,511	,928
soru26	153,29	955,327	,323	,929
soru27	154,12	949,163	,485	,928
soru28	154,96	930,807	,609	,927
soru29	154,03	963,852	,297	,929
soru30	153,88	945,986	,512	,928
soru31	153,80	931,958	,679	,926
soru32	154,29	937,679	,548	,927
soru33	154,48	931,283	,654	,926
soru34	154,84	927,136	,534	,927
soru35	154,94	930,114	,538	,927
soru36	153,52	938,841	,595	,927
soru37	154,07	934,627	,572	,927
soru38	154,80	986,870	-,065	,933
soru39	155,04	969,277	,130	,931
soru40	155,45	980,516	,009	,931
soru41	153,43	964,102	,200	,930
soru42	154,52	929,136	,571	,927
soru43	153,64	969,440	,136	,930
soru44	154,87	928,850	,611	,927
soru45	153,39	937,624	,550	,927
soru46	154,48	910,106	,796	,925
soru47	154,48	924,136	,773	,926
soru48	154,99	985,603	-,054	,932
soru49	154,64	910,940	,773	,925
soru50	153,71	930,944	,644	,926
soru51	153,59	935,274	,708	,926

Figure C. 3 Item Total Statistics

APPENDIX D Items, Institutions and Results

	1pe1	Pass
	1pe2	Pass
	1pr1	Pass
	2pe1	Fail
	2pe2	Fail
	2pe3	Pass
	2pr1	Pass
	2pr2	Pass
	2t1	Pass
	3pe1	Pass
	3pe2	Pass
	3pe3	Pass
	3pe4	Pass
	3pe5	Pass
	3pr1	Fail
	3pr2	Fail
	3pr3	Fail
	3pr4	Fail
	3t1	Pass
	3t2	Pass
	3t3	Pass
	4pe1	Pass
	4pe2	Fail
	4pe3	Fail
	4pe4	Fail
	4pr1	Fail
	4pr2	Fail
	4t1	Pass
	4t2	Fail
	4t3	Fail
	5pe1	Fail
	5pr1	Fail
	5pr2	Fail
	5t1	Fail

Figure D. 1 The Results of Institution A

	1pe1	Pass
	1pe2	Pass
	1pr1	Pass
	2pe1	Pass
	2pe2	Pass
	2pe3	Pass
	2pr1	Pass
	2pr2	Pass
	2t1	Pass
	3pe1	Pass
	3pe2	Pass
	3pe3	Pass
	3pe4	Fail
	3pe5	Pass
	3pr1	Pass
	3pr2	Fail
	3pr3	Pass
	3pr4	Pass
	3t1	Pass
	3t2	Pass
	3t3	Pass
	4pe1	Pass
	4pe2	Fail
	4pe3	Fail
	4pe4	Pass
	4pr1	Fail
	4pr2	Fail
	4t1	Pass
	4t2	Pass
	4t3	Pass
	5pe1	Fail
	5pr1	Fail
	5pr2	Pass
	5t1	Fail

Figure D. 2 The Results of Institution B

	1pe1	Pass
	1pe2	Pass
	1pr1	Pass
	2pe1	Pass
	2pe2	Fail
	2pe3	Pass
	2pr1	Pass
	2pr2	Pass
	2t1	Pass
	3pe1	Pass
	3pe2	Pass
	3pe3	Pass
	3pe4	Pass
	3pe5	Fail
	3pr1	Fail
	3pr2	Fail
	3pr3	Pass
	3pr4	Fail
	3t1	Fail
	3t2	Pass
	3t3	Pass
	4pe1	Pass
	4pe2	Pass
	4pe3	Pass
	4pe4	Fail
	4pr1	Fail
	4pr2	Fail
	4t1	Pass
	4t2	Pass
	4t3	Pass
	5pe1	Fail
	5pr1	Fail
	5pr2	Pass
	5t1	Fail

Figure D. 3 The Results of Institution C

	1pe1	Pass
	1pe2	Pass
	1pr1	Pass
	2pe1	Fail
	2pe2	Pass
	2pe3	Pass
	2pr1	Pass
	2pr2	Pass
	2t1	Pass
	3pe1	Pass
	3pe2	Pass
	3pe3	Pass
	3pe4	Pass
	3pe5	Pass
	3pr1	Fail
	3pr2	Fail
	3pr3	Fail
	3pr4	Fail
	3t1	Pass
	3t2	Pass
	3t3	Pass
	4pe1	Pass
	4pe2	Pass
	4pe3	Pass
	4pe4	Fail
	4pr1	Fail
	4pr2	Fail
	4t1	Pass
	4t2	Fail
	4t3	Fail
	5pe1	Fail
	5pr1	Fail
	5pr2	Fail
	5t1	Fail

Figure D. 4 The Results of Institution D

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ☐

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

YAZARIN

Soyadı :
BAYKIZ
Adı :
Tekin
Bölümü :
Bilişim Sistemleri (IS)

TEZİN ADI (İngilizce) :
AN ASSESSMENT OF KNOWLEDGE MANAGEMENT MATURITY AMONG THE PUBLIC INSTITUTIONS IN TURKEY
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