

**KNOWLEDGE MANAGEMENT AWARENESS AND MATURITY LEVELS
OF SMALL AND MEDIUM ENTERPRISES (SMES) IN
TECHNOPARKS OF TURKEY**

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TECHNOPARKS OF TURKEY**

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ABSTRACT

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Knowledge is one of the most important capitals in this information era. Maximizing the use of knowledge for improving entrepreneurship, innovation and technological development while focusing on the long-term vision of the organization, will enhance the organization resilience to challenges and obstacles and improve its competitiveness. With that awareness and realizations of the importance of well-managed knowledge, more and more enterprises, including Small and Medium Enterprises (SMEs), are incorporating Knowledge Management (KM) and implementing Knowledge Management Systems (KMS) into their workflows. With KM practices, many organizations could achieve the competitive advantage and innovation so that they can compete with other organizations. The main objective of this research is to assess the awareness and the current maturity of Turkish SMEs in technoparks. This study also involves a systematic and comparative literature of the best practices and critical success factors of KM practices in creating the model of KM awareness. G-KMMM or General KM Maturity Model inspires the model of KM maturity level. The data is mainly acquired through questionnaire of 120 companies throughout the technoparks. The main result of this study is that most of the surveyed SMEs are aware of the best practices of KM. However, most of them have low maturity levels of KM meaning that they are adopting it partially and still at a shallow level. In the correlation analysis, some of Aspects in KM Awareness and Maturity Levels are affected by the size, age, annual revenue, location, sector, and industry of the company. The result of this study provides understanding on how surveyed SMEs act and behave toward KM practices and it can be used for broader scope of study of the whole Turkish SMEs or SMEs in developing countries.

Keywords: Knowledge Management, Knowledge Management Systems, Small and Medium Enterprises

ÖZ

TÜRKİYE TEKNOPARKLARINDA KÜÇÜK VE ORTA BOY İŞLETMELERİN BİLGİ YÖNETİMİ FARKINDALIK VE OLGUNLUK SEVİYELERİ

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Bilgi, bilişim çağının önemli değerlerindedir. Organizasyonun uzun vade girişimcilik, yenilikçilik ve teknolojik gelişimin iyileştirilmesi için bilgi kullanımını en yüksek seviyeye çıkarması organizasyonun zorluk ve engellere karşı direncini ve rekabet gücünü artıracaktır. İyi yönetilen bilginin öneminin farkındalığı ile Küçük ve Orta Boy İşletmeler (KOBİ) dahil olmak üzere ve gitgide daha fazla işletme kendi iş akışlarına bilgi yönetim sistemlerini katmaktadır. Bu bilgi yönetimi sayesinde birçok örgüt rekabet üstünlüğü ve yenilikçi anlayış ile diğer işletmelerle rekabet edebilir. Bu araştırmanın temel amacı Türkiye'deki teknoparklarda bulunan Kobilerin bilgi yönetimi farkındalığı ve mevcut durumdaki uygulamalarını değerlendirmektir. Bu çalışma sistematik ve karşılaştırmalı en iyi uygulamalar ve bilgi yönetimi bilinçlendirme modeli yaratılmasında, bilgi yönetiminin kritik başarı koşullarını kapsamaktadır. Bilgi yönetimi modeli, olgunluk seviyesi olarak G-KMMM (Genel Bilgi Yöntemi Olgunluk Modelini) temel almaktadır. Elde edilen veriler, teknoparklardaki 120 şirkete uygulanan anket çalışması ile elde edilmiştir. Bu çalışmanın ana bulgusu, Kobilerin çoğunluğunun en iyi bilgi yönetim uygulamalarından haberdar olmalarıdır. Fakat çoğu, bilgi yönetimini olgunluk seviyesi düşük seviyelerde ve kısmen uygulamaktadır. Şirketlerin büyüklüğü, yaşı, cirosu ve buldukları yer gibi birçok farklı etkenler farkındalık ve olgunluğu etkilemektedir. Bu araştırma ankete katılan Kobilerin bilgi yönetimi uygulamalarına karşı tutum ve davranışlarını ortaya koymaktadır. Bu araştırma, daha kapsamlı olarak Türkiye'deki ve gelişmekte olan ülkelerdeki Kobilerin durumları ile ilgili yapılan çalışmalarda kullanılabilir.

Anahtar Kelimeler: Bilgi Yönetimi, Bilgi Yönetim Sistemleri, Küçük ve Orta Ölçekli İşletmeler

DEDICATION

To my wife, daughter, my parents, and my family

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CHAPTER I

INTRODUCTION

1.1 Background of the Study

In this era of information, organizations should manage their knowledge to be innovative and to gain competitive advantage (Turban, Sharda, & Delen, 2011) (Carneiro, 2000). Managers can use knowledge as resources that can aid competitive initiatives and innovative efforts, such as improving customer's satisfaction, developing new products, and fostering faster response. Knowledge could also help the managers in their decision-making, problem solving, and problem anticipation process, by providing the insight for the solutions. By managing knowledge and focusing on the long-term vision and policies, organizations could solve many challenges, problems, and obstacles. Most of organizations are now seeing the importance of well-managed knowledge.

However, managing the knowledge is not an easy task. Organizations shall consider some critical factors, challenges, and issues to maximize the potential uses of their available knowledge. Therefore, organizations should seek Knowledge Management (KM) activities to achieve the goal, such as the people and management aspects of culture of sharing and collaboration.

The main objective of KM is to recognize, acquire, store and keep, maintain, and deliver knowledge that could be useful to anyone whenever it is needed (Turban, Sharda, & Delen, 2011). To achieve the objective, organizations could also take ICT/IS and technological aspects into account when implementing the KM practices. Organizations could use ICT/IS to support and facilitate knowledge management activities that allow faster and more efficient processing (Mitchell, 2003). ICT/IS

could also accelerate the growth of knowledge within organizations. Therefore, by integrating the ICT/IS into the KM activities, organizations could enable dramatic improvement for any activities related to the KM. The use of ICT and IS in KM leads to the term of Knowledge Management Systems (KMS).

KM/KMS has impacts on the organization's behavior patterns. These impacts may differ in any organization according to the activities, sectors, industries, sizes, etc. Organizations may have different views and strategies regarding the KM.

Nowadays, every type and size of organization can compete each other. Since well-managed knowledge could help organizations to secure competitive advantage and to be innovative, well practices of KM/KMS could help Small and Medium Enterprises (SMEs) to survive in the competitive world.

1.2 Purpose of the Study

The object of this study is the Turkish SMEs in technoparks. With this study, the author is trying to:

- Investigate SMEs' perceptions and behaviors towards KM practices.
- Analyze their awareness of the importance of KM Practices of SMES.
- Assess the current maturity levels of KM in SMEs.
- Analyze the correlation of the size, age, annual revenue, and location towards KM practices awareness and maturity levels in SMEs.
- Analyze the correlation between the awareness of KM practices and KM Maturity Levels.
- Identify the triggers, motivation, and barriers of KM practices in SMEs.

1.3 Significance of the Study

The results of the study may have potential implications for Managers or Decision Makers in any type of institutions/enterprises, especially Small and Medium Enterprises (SMEs) on developing strategies for creating successful KM practices in their environment. Government and technopark management may also know the current situation in the most SMEs so that regulations could be made to guide in possible courses of action. The understanding of the influence of Information

Communication and Technology (ICT) and Information Systems (IS) is useful for developers to provide what are the required aspects to build KMS, where they could focus to make them better.

In general, the study has also some positive implications on filling the research gap in the area of Knowledge Management, as well as in the fields of Business and Management and Information Systems.

1.4 Definition of Terms

Awareness: having knowledge or perception of a situation or fact (Oxford, 2004).

Knowledge: a beneficial and practical use of information that could be in either explicit or implicit form that related in the context of social and cultural, where the creation of knowledge itself depends on the creation of information which is based on facts and data (Roberts, 2000).

Knowledge Based Systems: systems that can undertake intelligent tasks in a specific domain that are normally performed by highly skilled people (Miresco and Pomerol in (Arain & Pheng, 2006)). Knowledge-Based Systems are related closely with the systems that use previous knowledge to help in the decision-making processes (Silverman, 1995).

Knowledge Management: the systematic, structured, and active management of ideas, information and knowledge residing in employees of an organization so that other employees can make use of them to be more successful, effective and productive (Alavi & Leidner, Knowledge Management Systems: Issues, Challenges, and Benefits, 1999) (Davenport & Prusak, 1998).

Knowledge Management Systems: the use of Information Technology (Information Communication Technology and Information Systems (ICT/IS)) to systematize, enhance, and expedite intra- and interfirm KM (Alavi & Leidner, Knowledge Management Systems: Issues, Challenges, and Benefits, 1999). KMS covers Knowledge Creation and Discovery Systems, Knowledge Storage Systems, Knowledge Sharing Systems, and Knowledge Applications Systems that includes tools to be used (Becerra-Fernandez, González, & Sabherwal, 2004).

Knowledge Management Tools: the use of specific forms or techniques in KM practices (Young D. , 2010) (Zanjani, Mehrasa, & Modiri, 2009). They could be IT-based (automated) or non-IT-based (Zanjani, Mehrasa, & Modiri, 2009). There is no unified definition of the term in the literature. For example, in knowledge sharing, the tools could be the use of groupware computer application (IT-based) or meeting in a room (non-IT-based).

Maturity: the state, fact, or period of being mature (Oxford, 2004).

SMEs (Small and Medium Enterprises): the companies that have less than 250 human resources (OECD, 2010). The definition of SMEs could vary between countries. In US, SMEs are organizations that have less than 500 employees. World Bank defines SMEs of organizations that have less than 300 employees.

Technopark: the technological development zone prepared for university-industry collaboration created in 2001 (WebRazzi, 2012) (Muhasebe Rehberi, 2014).

1.5 Limitation of the Study

It is important to recognize the limitations of this research, which not only could inform us regarding generalizability, but also give us clues about opportunities for further research. These are the limitations regarding this research:

- The study of KM/KMS can be approached from three orientations: the nature of the knowledge, organizational and managerial aspects of implementation including its social aspects, and the utilization of knowledge management Systems (KMS) including the technological aspects (Geisler, 2007). This research is more focused on the two perspectives, management and people aspects as well as the ICT perspectives by doing a survey on Small and Medium Enterprises (SMEs) regarding the awareness and perceptions over KM and the current practices taken towards the KM.
- The objects of the research are the SMEs in Turkey. However, it could be extended to KM practices in the developing countries for comparisons.
- We limited the sample of Turkish SMEs to SMEs at technoparks for convenience and limited resources reasons.
- The samples were collected between October 2013 and February 2014.

1.6 Organization of the Study

This study takes place of a logical order. Chapter 1 explains introduction, which includes background, purpose and significance of the study, definition of terms, limitations, and the explanation of the organization of the study. Chapter 2 presents the literature review, theories related to the subject of the research, which is Knowledge Management and its application in the Small and Medium Enterprises. Chapter 3 presents the research model on Awareness/Perceptions and Maturity Level on KM/KMS practices in Turkish SMEs. Chapter 4 presents the research method, data analysis, results and the explanation of the research phases. Chapter 5 presents the discussion of the research findings and implications along with the limitations of the study. There is also a conclusion part, which is summarizing the whole study including the key findings and further research suggestions.

CHAPTER 2

LITERATURE REVIEW

2.1 Knowledge Management (KM) Practices in Organizations

2.1.1 Knowledge

Before exploring the depth of Knowledge Management practices in organizations, it is better for us to have understanding of what knowledge is. There are many definitions and explanations of knowledge. According to Nonaka and Takeuchi, Knowledge is a justified true belief. (Nonaka & Hirotaka, *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*, 1995). Roberts defined knowledge as beneficial and practical use of information that could be in either explicit or implicit form that related in the context of social and cultural, where the creation of knowledge itself depends on the creation of information which is based on facts and data (Roberts, 2000). The social and cultural context correlates that knowledge could be created and transformed through social processes, human interaction, and diffusion in community, education and learning process.

In a company or organization, knowledge could vary in many forms. It could be expertise, knowledge related to the markets, competitors, and suppliers. It could also be a strategic knowledge related to the long term of corporate vision and strategies of the company (Becerra-Fernandez, González, & Sabherwal, 2004).

Knowledge, moreover, is sometimes confused with the term of information and data. Even though there are connections between them, they are different. Data are the property with potential meaning to someone who can interpret. It could be also facts, measurements, observations, perceptions, and statistics. Data represents raw numbers,

structured records, assertions, or anything that has a meaning or about events. (Turban, Sharda, & Delen, 2011) (Becerra-Fernandez, González, & Sabherwal, 2004) (Davenport & Prusak, 1998). In the other hand, information is an organized /processed/constructed data, which is created through the attribution of the meaning. Information involves manipulation of raw data (Turban, Sharda, & Delen, 2011) (Becerra-Fernandez, González, & Sabherwal, 2004) (Davenport & Prusak, 1998). In the further form, knowledge is information that is relevant to the context and actionable (Turban, Sharda, & Delen, 2011).

We should understand that knowledge constantly changes over time since it synthesizes the perceptions of the target environment (Boahene & Dittsa, 2003). The main difference between information and knowledge is that knowledge requires an ability to act or needs an action (Davenport & Prusak, 1998). However, information as a resource is not always valuable since information overload can distract one from what is important. Knowledge can be valuable when it focuses toward what is important. Knowledge implies an implicit understanding and experience that can discriminate between its use and misuse. Knowledge is also dynamic in nature (Turban, Sharda, & Delen, 2011). Wisdom is the recognition and understanding of the fundamental principles of knowledge patterns.

Therefore, from the definition, we can say that there are hierarchical relationship between data, information, and knowledge. From the definition above, we can summarize the differences between them as in Figure 1:

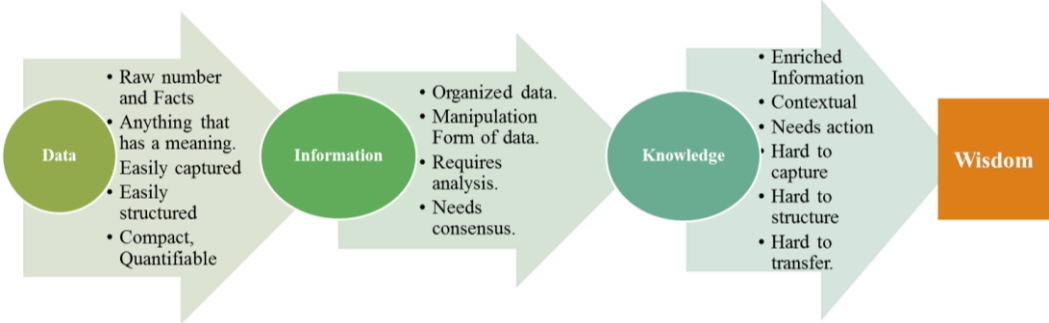


Figure 1. Relational Diagram between Data, Information, and Knowledge

2.1.2 Characteristics of Knowledge

Knowledge is at the higher, which is the richer, deeper, and more valuable compared to data and information (Becerra-Fernandez, González, & Sabherwal, 2004). The most

prominent feature of knowledge is that knowledge born from human interaction. It is not waiting to be found or discovered or collected. People in their interactions with each other and their environments have created knowledge. To understand knowledge, we should understand the human beings and interactive process how knowledge created (Nonaka, Toyama, & Hirata, *Managing Flow: A Process Theory of the Knowledge-Based Firm*, 2008).

The most critical characteristics of knowledge are subjective, process-relational, aesthetic, and created in a practice. (Nonaka, Toyama, & Hirata, *Managing Flow: A Process Theory of the Knowledge-Based Firm*, 2008)

- Knowledge is subjective. Knowledge is created by people in their interactions. Human beings have different subjective viewpoints that are necessary for the creation of the knowledge. Knowledge cannot occur without human subjectivities and its surrounding contexts. Knowledge is always related to the values, context, and power. Knowledge requires value judgment to become knowledge. This is different with information that do not, and cannot differ depending on the user. It is subjectivity that interprets the significance of information. Every organization has its own perspectives in reacting over the reality that creates different values from other organizations.
- Knowledge is process-relational. Humans are not passive beings that are defined and formed by the environment. We are actively seeking to define ourselves and reform the environment through interactions. Knowledge is created of the multiple perspectives of human interactions that enable us to see various aspects of phenomenon in different contexts that are viewed together. It is a social process of validating truth. In an organization, knowledge is created through the interaction with their staff, markets, and environment including the competitors.
- Knowledge is aesthetic. Humans formed aesthetic knowing, through activating the specific capacities of their sensory-perceptive faculties, to make aesthetic judgments. Aesthetic sense is also used for determining what kind of knowledge to create. A firm can see the new opportunities, market, new technologies or new business models based on the vision, ideals, and aesthetic sense in the organizational member. Based on those visions, the organization

can create knowledge related to the firm's existence and the environment in which it operates.

- Knowledge is created through practice. Based on the characteristics that have been mentioned before, we know that knowledge can only be created with the practice that deals with specific situations. If there are changes, organizations should be able to improvise by reacting quickly and appropriately, to an unpredictable situation.

Other characteristics of the importance of knowledge in organizations are: extraordinary advantage and increasing returns, it is not depleted when used, required to be regularly updated as the starting point of enhancing the competitive advantage, the intangible aspect that is difficult to estimate of its value and impact. (Turban, Sharda, & Delen, 2011)

Knowledge is information possessed in the mind of individual. It is personalized or subjective information related to the facts, procedures, concepts, interpretations, ideas, and judgment. (Alavi & Leidner, Knowledge Management Systems: Issues, Challenges, and Benefits, 1999). Knowledge has no value if someone does not take advantage of it. Knowledge never becomes completely obsolete since it is built based on previous experience. The old knowledge combined with new context resulting in new knowledge. The insight providing the context of knowledge reuse. (Duffy, 2000).

2.1.3 Types of Knowledge

Many authors have divided knowledge into some types. The most well-known types of knowledge are Explicit and Tacit Knowledge. (Nonaka, The Knowledge Creating Company, 2008) (Pearlson & Saunders, 2006) (Roberts, 2000). Explicit Knowledge copes with more unbiased, objective, logical, and technical knowledge, which has been codified. Tacit Knowledge is usually cope with subjectivity, related to cognition, and based on experience and observation learning. It is difficult to maintain and formalize since it is intangible. (Turban, Sharda, & Delen, 2011) (Nonaka, The Knowledge Creating Company, 2008). The other types of knowledge according to Alavi and Leidner are: Tacit, Explicit, Individual, Social, Declarative, Procedural, Causal, Conditional, Relational, and Pragmatic (Alavi & Leidner, Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues, 2001).

Knowledge is created from the continuous interaction of tacit and explicit knowledge. Another difficulty of managing knowledge is located on the managing the tacit knowledge, which is highly personal, hard to formalize, not so easily expressible, and difficult to communicate to others. (Nonaka, *The Knowledge Creating Company*, 2008). Tacit knowledge, even though difficult to manage, has an important cognitive dimension, which consists of mental models, beliefs, and perspectives. In organization, tacit knowledge is important which related to decision-making process, time-management, quality, and competitiveness. (Haldin-Herrgard, 2000). The main constraint with the tacit knowledge sharing is the link between the perception and language. Face-to-face meeting is more appropriate for distribution of tacit knowledge. There should be an act of expression and conversion from tacit to the explicit form, which converts the tacit knowledge into printed and documented materials.

There are also general and specific knowledge. General knowledge is possessed by a large number of people and can be transferred easily across individuals. On the other hand, specific knowledge is possessed by limited number of people and expensive to transfer. Specific knowledge is divided into two parts: technically specific and contextually specific knowledge. Technically specific knowledge is a deep knowledge in a specific area. Contextually specific knowledge refers to the use of knowledge that should be performed in the particular situations and in a specific time and place. (Becerra-Fernandez, González, & Sabherwal, 2004).

2.1.4 Knowledge-Based Economy

Warsh explained that the expansion of knowledge and its management activities has always been important for the wealth of nations, where he showed that existence of knowledge in many different forms such as trade secrets, formulas, and trademarks that have significant economical values (Warsh, 2006). Adler (Adler, 2001) agreed with Warsh and stated that knowledge can increase economic development over time. As knowledge becomes increasingly important in the economic development of nations, many authors explain the concept of knowledge as a source of economic development as the term “Knowledge-Based Economies” (Kalim & Lodhi, 2002) (Adler, 2001) (Turban, Sharda, & Delen, 2011). These economies give thought that knowledge as the most significant factor for a competitive environment in countries and firms, as well as being fundamental enhancement of wealth and prosperity of the

society. Every firm has to develop strategies to increase competitive advantage by managing their intellectual assets for optimal performance (Turban, Sharda, & Delen, 2011)

The term of intellectual capital is often used as a synonym for knowledge indicating the financial value of knowledge. These days, the most significant and valuable aspect of intellectual capital is knowledge. Knowledge becomes a strategic resource, which could be used to create a competitive advantage enabling managers to transform knowledge to be distinctive capabilities (Turban, Sharda, & Delen, 2011). Nonaka adds that the new knowledge always starts in the individual, so it is personal. Making personal knowledge available to others is the main activity in the knowledge-intensive or knowledge-creating company (Nonaka, *The Knowledge Creating Company*, 2008). For many organizations, the ability to develop and exploit knowledge faster than their competitors, is a crucial key to be competitive that can survive in this fast changing and dynamic business world (Turban, Sharda, & Delen, 2011).

2.1.5 Knowledge Management

Knowledge plays a very important role in the individual, people, organization, and even the nations since it could be the reflection and the distinct character of the economic development of one group from others (Warsh, 2006). The realization of the importance of knowledge and its utilization leads to the term of Knowledge Management (KM) and Knowledge Management Systems (KMS).

Knowledge Management (KM) has a variety of meanings according to many authors. Knowledge management is the systematic, structured, and active management of ideas, information and knowledge residing in employees of an organization so that other employees can make use of them to be more successful, effective and productive (Alavi & Leidner, *Knowledge Management Systems: Issues, Challenges, and Benefits*, 1999) (Davenport & Prusak, 1998).

The management of knowledge enables effective and efficient to provide insight in the problem solving, dynamic learning, strategic planning, and decision-making. KM is the activities that assists organizations recognize, choose, organize, share and transfer expertise to others that are part of the organization's memory and that typically reside within the organization (Turban, Sharda, & Delen, 2011). According to Mitchell (Mitchell, 2003), KM is an encouraging process that includes the systematic creation,

capture, store, and share the knowledge and learning for the benefits of the whole organization.

By managing knowledge, the company can innovating by looking up all the new knowledge possibilities while also looking at the existing ones. According to Turban, et. al., KM comes from the concepts of organizational learning and organizational memory. The learning organization refers to an organization's capability of learning from its experience. Learning involves an action regarding the experience and competence. To build a learning culture, the organization should have an organizational memory, which means saving, representing, and sharing its organizational knowledge. These activities are also related to the organizational learning or the development of new knowledge and insight that have potential influence to the organizational behavior. Organizational memory becomes the part of organizational culture to behave onto the environments, markets, opportunities, etc. Organizational culture covers collaboration and teamwork as important factors of successful KM environment (Duffy, 2000).

Successful and agile companies, besides managing financial assets (cash, buildings, and infrastructures), should be able to manage intellectual assets (skills and experiences, innovation, and customer's preferences) (Duffy, 2000). KM helps organizations leveraging intellectual assets to create high-performance business techniques.

Knowledge can be lost in the company by many activities, such as layoffs of the staff, their unwillingness of knowledge sharing, etc. Nowadays, KM is important to all organizations to overcome the complexity of problem domain, market volatility, and possibility of staff turnover (Becerra-Fernandez, González, & Sabherwal, 2004).

Goals of KM are to make enterprises take action intelligently to secure its overall success factors as well as to perceive the best value of its knowledge sources (Wiig, 1997). For organizational success, knowledge must be exchangeable among staff members and it must be able to expand based on previous ones. Knowledge related to the problem solving should be managed so it can promote organizational learning, leading to further insights for other (Duffy, 2000).

2.1.6 Knowledge Management Systems: ICT, IS, and Mechanism to support KM

According to Alavi and Leider, KMS refers to the use of Information Technology to systematize, increase, and accelerate intra- and interfirm KM. (Alavi & Leidner, Knowledge Management Systems: Issues, Challenges, and Benefits, 1999). Becerra-Fernandes, et. al. stated that KMS is the combination between technologies and social/structural procedures and mechanisms (Becerra-Fernandez, González, & Sabherwal, 2004).

Behind the KMS, there should be procedures and mechanisms that is used to promote KM throughout the organization that includes learning by doing, on-the-job training, learning by observation, and face-to-face meetings (Becerra-Fernandez, González, & Sabherwal, 2004). The KM mechanism in KMS is important because the training and learning aspects, such as media of representation, multiple perspectives, complexity, user control, online support, and navigation aids are important (Leung, 2004).

Turban, et. al., explained that the ICT can be integrated to the KM activities and processes in the knowledge acquisition, knowledge selection, knowledge generation, knowledge use, knowledge internalization, and knowledge transfer.

IT is rapidly changing and becoming more sophisticated these days. It is recognized as a useful and effective tool for KM. It is recommended that managers recognize the benefits of IT and implement according to the requirements rather than following the trend. Due to IT revolution and advancement, the value of knowledge assets has been greatly enhanced (Tseng, 2008).

Mitchell says that technology can be used as an enabler (enabling previously impossible activities) as well as add some value to the management and operation of organization (Mitchell, 2003). According to Mitchell, Many technologies can be implemented in KMS, such as data warehousing, groupware, and client-server systems. Another example of implementation of ICT in KM are document management systems, policies and procedures stored in network (Duffy, 2000). However to be able to implement effectively, all staff should have been trained thoroughly. When the use of ICT is maximized, organization can gain value from the investment (Mitchell, 2003).

There are myriad options of KMS to support the KM practices. Some functionalities of e-business and daily operations applications such as SCM (Supply Chain Management) and CRM (Customer Relation Management) can also be covered under the umbrella term of KMS (Koh & Maguire, 2004). KMS is a type of enterprise application that can be used in all departments, roles, functions, and levels within organizations (Laudon & Laudon, 2012). Since KMS is a part of research model of this study, the further details related to KMS could be found in Chapter 3.

2.2 The Impacts of KM in Organizations

People tend to transfer knowledge through socialization and education (Roberts, 2000). The knowledge processes can also take place in the organization including its creation, storage, transfer, and application. Knowledge reuse and transfer in the organization will take place as most of organizations will use the best practice in always changing environment. In organizations, the transfer of knowledge could be related to strategic knowledge between alliances and partners, best practices, and technology transfer (Joshi & Sarker, 2003).

2.2.1 The Benefits Impacts and the Importance of KM

According to Becerra-Fernandes, et. al., KM has benefit impacts on four level in the organization: people, processes, products, and overall performance (Becerra-Fernandez, González, & Sabherwal, 2004).

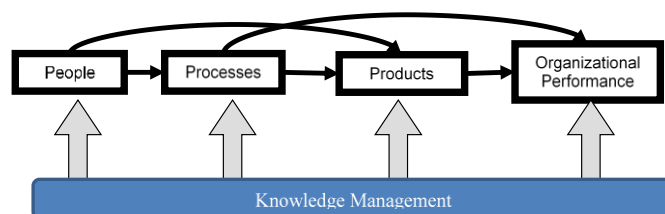


Figure 2. Impacts of KM on Organizations

In the level of people aspects, KM can facilitate employee learning by knowledge processes supported by KM, which causes employees to become more flexible and are likely to adapt when they interact with others. They are also more likely to accept change and more prepared to respond to change. KM also provides employees with solutions of previous problems they have encountered.

In the level of processes aspects, KM enables improvement in the effectiveness, efficiency, and the degree of innovation in the organizational processes. It also enables organizations to become effective by helping them to select and perform the most appropriate processes that enables them to adapt quickly to changes. Effective and well-managed knowledge could also enable organizations to be more productive and efficient. Innovative solutions could be developed through the knowledge sharing across the staff in the organizations.

The ICT/IS aspects in the KMS could help companies to excel the KM practice, which already explained in previous parts.

2.2.2 KM & KMS Challenges and Issues

It is not guarantee that if the organization invests in newest bleeding-edge technologies, it will ensure that KM will succeed on that organization. Park and Choi explained why Accenture company has failed in its implementation of KM is because did not take into consideration of local or regional challenges related to the cross-cultural challenges (Park & Choi, 2005). Park and Choi explained that KM failure factors could fall into four categories: technology, culture, content, and project management.

There are also difficulties and issues that should be taken into consideration in the knowledge management activities. The issues covers the limited condition of the knowledge recipient, distraction, the nature of knowledge transferred (tacitness, ambiguity, complexity, specificity, and codifiability), and the medium used as knowledge transfer between the source of the knowledge and the recipient of knowledge (Joshi & Sarker, 2003).

2.3 The Systematic Review of KM in SMEs

In the previous parts, we have seen that Managing knowledge efficiently and effectively is a core skill and capability that must be owned by people in organizations to survive. Since this study will do the research in the Small and medium Enterprises (SMEs), we will take a look deeper into the characteristics of SMEs and previous literatures regarding the implementation of KM and KMS in the SMEs.

2.3.1 SMEs (Small and Medium Enterprises)

There are different definitions of SMEs in each region or country. For example, in EU countries, micro enterprises should have human resources less than 10, small should have less than 50, medium and SMEs should have less than 250 (OECD, 2010). Enterprises that have more than 250 should be categorized as large firms. In US, micro enterprises should have human resources less than 10, while small enterprises should have less than 100, and medium and SMEs should have less than 500. In Turkey, for micro enterprises, they should have human resources less than 20, small should have less than 50, medium and SMEs should have less than 250. Since this study is about Turkey, therefore, the definition of SMEs are the enterprises that have human resources less than 250 persons.

According to IFC, World Bank, SMEs have characteristics of having employees no more than 300, total assets and total annual sales less than 15 million USD (Fan, 2003). SMEs are divided into three categories: micro enterprises with less than 10 staff, total assets and annual sales less than 100 thousand USD; small enterprises with less than 30 staff with total assets and annual sales less than 3 million USD; and medium enterprises which defines the characteristics of SMEs above.

SMEs have some characteristics: (Wong & Aspinwall, *Characterizing Knowledge Management in The Small Business Environment*, 2004), where the owner is usually the managers that usually multi-tasked, the simple and flat structure with that requires few decision makers, dominated by informal environments, more flexible to change, and less number of expert available.

SMEs are the engine of economic growth in most countries (Fan, 2003). They are also essential for a competitive and efficient market. They play an important role for poverty reduction and provide numerous of employment in most countries. SMEs are also the main source of innovations and new products.

In most countries, the number of SMEs is 99 % leaving only 1 % of large enterprises (Fan, 2003) (OECD, 2010). Despite those the large percentage of number of SMEs, very few of them are innovative: product innovation, process innovation, non-technological innovation, new market innovation, and collaboration in innovation activities. The problems of innovativeness in SMEs are believed to be caused by the

non-effective administrative processes in SMEs as well as the limitation of the resources.

OECD believed that innovativeness of SMEs could be fostered with the knowledge management related activities (OECD, 2010). SMEs are key players in innovation because they bring new ideas to the market. However, they do not innovate by themselves but in collaboration with suppliers, customers, competitors, universities, research organizations and others. SMEs often lack of human and financial resources to take advantage of opportunities. They also have difficulties in competition since most of them are just newcomers (Susman, 2007).

The success of innovation in SMEs can be related to the company's strategy of the use of company's network, the use of technology, internalization, role of public sector, knowledge management, and core competency (Susman, 2007). Innovation can lead to development of products or services that competitors cannot imitate, but customers will pay a high price.

Learning processes are the core and the essential component of entrepreneurship and SMEs development so that SMEs are able to make a new business, survive and grow (OECD, 2010). In addition to the learning processes, skills are highly needed for them. There are basic skills that should be fulfilled for SMEs to survive, like administration, literacy, technical, management, social and communication, multi-language and cultural, routine skills, and finally yet importantly the entrepreneurship and green skills. All of these skills are highly related to knowledge. The successful businessperson or entrepreneur should be able to identify and extract knowledge that is relevant, so that he/she can recognize available opportunities significant for his/her personal, professional, and/or business activities.

The existence of SMEs are important since SMEs can provide provisions of wide range of products and services to large enterprises (Ghobadian & Gallear, 1997). Most of small firms became suppliers for large enterprises. The structure is also different, where large enterprises have span of control over different departments and SMEs have flatter structure.

There are many other different characteristics for SMEs and large enterprises. Creativity of personnel is highly needed in SMEs, they also have limited resources and short decision making processes etc. (Ghobadian & Gallear, 1997). SMEs are also

having many advantages such as high visibility of activities and qualities in SMEs by managers, closer relationship between employees and customers, etc. However, SMEs have some limitations, such as: Resources limitations, limited decision making process and management capability, few and simple regulations. (Fan, 2003)

Rasheed explained that the differences of the implementation impacts of KM in SMEs and large organizations are mainly located on four aspects: management, structure, culture, and human resource (Rasheed, 2005). In SMEs that mostly have fewer layers of management, decision-making process is faster, yet it could look at more details and focus on the knowledge management process. In most large organizations, the knowledge management activities are often more complex and many managers do not focus on the knowledge management activities. In the structure aspect, since SMEs have simpler and less complex organizational structure, it will be easier to integrate KM activities in the organization, while large enterprises have complex bureaucratic procedures that make slower process of KM activities. In the culture aspect, SMEs tend to have more flexible culture than large enterprises, so it is easier for SMEs to change and implement KM activities. Regarding human resources aspects, it is obvious that most of SMEs do not have many available highly qualified staff, which can be a threat if specialized staff leave the organization unless his/her knowledge is captured, codified, and transferred through the organization.

2.3.2 KM in SMEs

The success of SMEs is related on how well they manage the knowledge (Zanjani, Mehrasa, & Modiri, 2009). However, SMEs, in fact, have different way of doing the KM, compared with the large organizations (Desouza & Awazu, 2006). Most SMEs understand the resource limitations and look for creative solutions to overcome those limitations. Rather than having strength in conventional resources, they can use knowledge to their advantage (Zanjani, Mehrasa, & Modiri, 2009). In order to do so, they have to be smart in exploiting the knowledge from the external world and their highly motivated staff members.

SMEs are also having less advanced KM implementation compared to large enterprises due to the lack investment of KM approaches and systems in SMEs (McAdam & Reid, 2001). McAdam and Reid have investigated the relation of KM activities (knowledge composition, realization, transfer, and application) in both SMEs

and large sector organizations that shows us both SMEs and large enterprises can gain so much from effective KM systems.

In order to successfully implement the KM in the SMEs, managers should determine the strategy, tactics, and use appropriate tools in KM activities (Zanjani, Mehrasa, & Modiri, 2009). SMEs also have to develop their understanding of KM further as a key business driver, rather than resource-intensive additional initiatives (McAdam & Reid, 2001).

According to Zanzani, et.al., the KM strategy that should be implemented is either codification or personalization. The KM tactic is either Individualization or Institutionalization. The KM tools are IT-based or Non-IT based. Codification involves securing knowledge and storing in a database for later use. Personalization is the strategy to manage knowledge, which is produced by human interaction. Codification is suitable for SMEs with more routines, while personalization is suitable for SMEs who need innovative cultures. Individualization is socialization tactics that are individual and informal, while institutionalization is more likely to be collective and formal. Individualization is suitable for small-sized, where institutionalization is suitable for medium-sized enterprises. The use of IT in KM is more suitable for SMEs whose staff is dispersed geographically, while non-IT is suitable when the staff is geographically concentrated (Zanjani, Mehrasa, & Modiri, 2009).

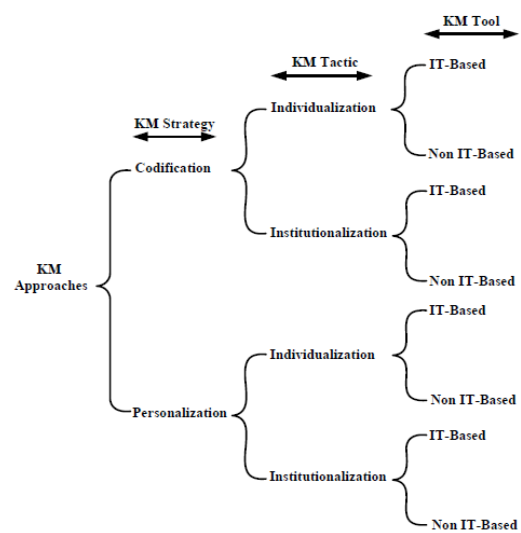


Figure 3. KM Strategy, Tactic, and Tool in SMEs (Zanjani, Mehrasa, & Modiri, 2009)

2.3.2.1 KM in Turkish SMEs

According to OECD, in 2006, Turkey has 2,313,720 enterprises out of which 99.9 % are categorized as SMEs, leaving 2475 firms or 0.1 % for large enterprises (OECD, 2010). The SMEs in Turkey consist of 407,521 SMEs that focused on manufacturing and 1,906,199 service-based SMEs. SMEs in Turkey hold 81.3 % of employment or about 6.548.876 people in 2006.

Almost all of the SMEs in Turkey are managed and owned by a family (Bozbura, 2007). They may withhold critical information from outsiders. Most of them are not hiring professionals for the key positions. Bozbura has created a model of assessing the success of KM in SMEs in Turkey consisting of four dimensions: training and mentoring employees, policies and strategies of knowledge management, knowledge capturing and acquisition from outside, and effect of organizational culture. However, the model lacks the implementation of ICT and IS for KM. From the subjects of Bozbura's research of 76 SMEs in manufacturing industry, we can see the result that most of the SMEs think that knowledge flow and sharing is not important. It is suggested by Bozbura that SMEs in Turkey should be made aware of the importance of KM in SMEs to be able to survive in this globalization era and today's rapidly evolving global market.

Nada, et.al. have investigated the readiness and maturity level of knowledge management application and innovativeness over 25 Manufacturing SMEs in Turkey (Nada, Ghanem, & Mesbah, 2012). The study done by Nada, et. al. indicated that the low level of maturity of innovativeness and knowledge application are related to the lack of innovation strategic plan, culture, formal process and assessment approach to measure impact of innovation projects. Nada, et.al. have identified that effective innovation in SMEs depends on innovation strategy, innovation process, leadership and culture, collaboration and partnering, business and technology, innovative organization, and learning. Turkish SMEs can also improve their innovativeness by managing the knowledge assets to leverage the creative ideas in the enterprise.

There is another KM research on IZGAZ, one of Turkish service-based energy enterprises, by Zaim (Zaim, 2006). Zaim has developed a model to assess the KM performances in relation with KM activities, including knowledge sharing, knowledge creation, and knowledge storage. The result of Zaim's research shows us that the implementation of KM in IZGAZ is still in an infancy level. It also shows that the

employees are aware that those three KM activities would have positive impacts on KM performance. From all three main activities in KM activities, knowledge sharing is the aspect that had the highest influence on the organizational performance.

2.3.2.2 KM in SMEs in Developing Countries

There are many other case studies about the implementation of KM and KMS in developing countries. Ogiwara, et. al. have compiled many successful cases of Asian SMEs that implementing KM without the use of ICT (Ogiwara, Young, Talisayon, & Bunyagidj, 2010). With KM, SMEs can learn from mistakes or improve the innovations through the previously collected best practices. Ogiwara, et. al. show that KM is used to manage the knowledge of SMEs from the customers, staff (specialized, sales representatives, etc.) in order to satisfy existing customer, attract more new customers, create new products, improve productivity, increase quality of products, services, and processes, and develop skills/motivation/teamwork among employees.

Jafari et.al. have done a research of the implementation of KM over 26 Iranian SMEs (Jafari, Fathian, Akhavan, & Hosnavi, 2007). Jafari et.al. found that there is no correlation between size of companies and the need of learning factors of KM (training; interactive participation of employees; flat structures in SMEs; and CEO support and commitment). Approving the theory, most of researched Iranian SMEs operate with tacit knowledge rather than explicit knowledge. Another finding is that the use of IT in the KM is not considered to have an important role in knowledge management in researched Iranian SMEs. Most of the researched SMEs see IT as a tool for facilitating some of their works and processes and not as an enabler for knowledge management. They also found that CEO support and commitment is important for the implementation of a system. Learning process in the KM activities is related to the interactive participation of the employees and flat structures in SMEs.

Valmohammadi has identified 12 critical success factors of the implementation of KM in 37 Iranian SMEs, including management leadership and support, organizational culture, information technology, KM strategy, performance measurement, organizational structure, processes and activities, rewarding and motivation, removal of resources constraints, training and education, human resources management, and benchmarking (Valmohammadi, 2010). From those 12 critical success factors,

management leadership & support and organizational culture were perceived to be the most critical factors of all.

2.3.2.3 KM in SMEs in Developed Countries

There are also many studies about the implementation of KM and KMS in the developed countries. In UK, which is regarded as developed country, according to Koh & Maguire's research, SMEs increasingly use enterprise applications, such as CRM, SCM, and ERP, but still not generally aware of how knowledge can be created with e-business applications for daily operations (Koh & Maguire, 2004).

In the continuation of the first study, regarding the KM practices, out of 123 researched UK SMEs, 92 % had not been using nor implementing KM activities in the firms (Maguire, Koh, & Magryst, 2007). Those SMEs are not implementing the KMS because of perceptual problems, such as lack of awareness of the importance of KM. Small organizations may find it difficult to justify a substantial financial commitment in an area that they do not recognize as a core element of their business. However, they are optimistic of what ICT could do in the future.

Nunes et.al. observed KM practices in two knowledge-intensive UK and European SMEs (Nunes, Annansingh, Eaglestone, & Wakefield, 2002). They developed a model of KM that consists of seven aspects: business value, organizational learning, knowledge construction, knowledge use, knowledge dissemination and transfer, KM barriers, and knowledge embodiment. In both SMEs, KM is not viewed as a business imperative or even a priority. Both SMEs cannot afford to invest in KM and ICT and have difficulties in establishing its business value. Managers of SMEs are not aware with the long-term potentials of KM. It has also been identified by Nunes et.al. that most KM activities are carried out informally and usually not supported with purposely designed ICT.

In Finland, out of 108 researched SMEs, most of them have high maturity and high awareness of KM implementation (Salojarvi, Furu, & Sveiby, 2005). 11 % of the cases them have implemented KMS, while 35 % of them have implemented e-business (CRM, SCM, etc.). However, only a minor of its samples of Finnish SMEs were able to benefit from their KM-related activities in terms of growth. Most of them feel that they are not growing despite having KM practice implemented in their organizations.

Finnish SMEs with a comprehensive and more balanced approach to knowledge and intangible assets (with conscious learning process and good leadership) are growing more than those with a less balanced approach.

There is a high amount of cooperation between SMEs in Holland and Belgium (Van Gils & Zwart, 2004). However, most of them are limiting the agreement related to the specific knowledge management processes. Several of them feared to lose their competitive advantage because of transferring their knowledge to the alliances.

External sources of knowledge are very important for SMEs. Most external sources come from customers and suppliers. Almost all of the UK service-based SMEs utilize this inter-organizational knowledge transfer (Chen, Duan, Edwards, & Lehaney, 2006). They are mostly using social and electronic networks for that purpose. Some of the researched companies are even transfer their knowledge with competitors to improve their business performance.

Desouza and Awazu have conducted a research regarding the implementation of KM, including the ICT, to the 25 US SMEs with less than 100 staff and revenues less than \$400,000 per year. They found five peculiarities that they believe would happen in other SMEs in other countries (Desouza & Awazu, 2006):

- The first peculiarity is that most SMEs in US accomplish knowledge transfer and creation through socialization (tacit to tacit knowledge) in the formal and informal methods.
- The second peculiarity is related with common knowledge that, most staff members have the similar knowledge towards issues because they all have had training at the entry. Most SME managers seek for the less qualified but highly motivated staff member as to train them further.
- The third peculiarity related to the loss of knowledge because of the leaving staff. Most SMEs would just promote next most competent person to fill the empty position and search for the new empty position. This happens because the SMEs are flexible.
- The fourth peculiarity is that most of US SMEs utilize external knowledge instead of creating themselves. They tend to look for the best practices of other companies and competitors rather than spending effort on knowledge creation.

- The fifth peculiarity is the use of ICT in SMEs mostly limited to process automation and informative purpose and never be used to manage knowledge due to the resource limitation.

2.4 Conclusions on Theories and Conceptual Backgrounds

From all the explanations given above, we could see that KM covers range of functions for personal growth and organizational effectiveness including knowledge acquisition, decision-making, communication, reference material sharing, and human resource management. From all these definitions and descriptions, KM is very important for organizational success since it influences many strategic aspects in the organization. KM is important to be implemented by any organization in order to enhance its competitive advantage, improve learning culture, decision support, and increase business performance.

However, there is still a lack of studies regarding KM in developing countries. In addition, the literature on KM rarely focuses on the ICT use of KM and KMS in SMEs. In Turkey, there are only four studies addressing the practices of KM in Turkish SMEs (Zaim, 2006) (Bozbura, 2007) (Nada, Ghanem, & Mesbah, 2012). Furthermore, they are focused only in manufacturing companies. This thesis aims to fill those gaps.

Table 1. Literature Review

Author(s), Year	Domain	Factor(s)/Variable(s)	Data Sources	Methods	Results
Nunes, Annansingh, Eaglestone, & Wakefield, 2002	Organizational and managerial aspects of KM implementation	size, business value, organizational learning, knowledge construction, knowledge use, knowledge dissemination and transfer, KM barriers, and knowledge embodiment.	2 knowledge-intensive UK SMEs	Case Studies, Observation and Interview.	Knowledge intensive SMEs acknowledge that KM activities can lead to greater innovation and productivity. Most SMEs cannot afford to invest in KM. Most managers in SMEs are not prepared. KM activities are done in an informal ways, which mostly not supported with purposely designed ICT.
Edler, 2003	Organizational and managerial aspects of KM implementation	Size, sector and industry, KM practices, Usage, Motivations, Triggers, Barriers, Roles, Performance Evaluation, Effects, Budget, Technology, Institutionalisation, KM and Innovation, Capture of External Knowledge,	1107 German SMEs (497 Respondents of Survey + 410 Respondents of a non-response analysis)	Survey (19 main questions, Approx. 109 submain questions)	Exploratory results in the KM Practices in the German SMEs. Knowledge has become a major asset for almost all industries, it is more and more protected for strategic reasons. External knowledge is widely used and highly important.
Koh & Maguire, 2004	Organizational and managerial aspects of KM implementation	Size, information and communications technology (ICT), Competitive advantage, and IS/IT strategy.	126 IT managers in UK SMEs	Survey	Increasingly applied e-business such as CRM, SCM, and ERP. SMEs are not realize that knowledge can be created and managed with e-business applications for daily operations.
Van Gils & Zwart, 2004	Organizational and managerial aspects of KM implementation	Size, Sector and Industry, Cooperative alliances and relationships, Knowledge sharing,	44 Belgian and Dutch SMEs	Case study of 169 relationships of 44 Belgian and Dutch SMEs.	cooperative relationships encountered amongst the SMEs was rather high and creating positive impact on them (increased turnover, higher profits and extension of their product range). Strategic alliances can help them to acquire those competencies to guarantee long-term survival.

Table 1. Literature Review (Continued)

Salojärvi, Furu, & Sveiby, 2005	Organizational and managerial aspects of KM implementation	size, industry type, age of company, Sustainable growth (sales growth), Knowledge management awareness (Awareness of KM activities and Processes), Intangible assets aptitude, KM maturity level, Human capital, organizational capital, and external capital.	108 Finnish SMEs	Survey (108 respondents) and Interview (10 respondents)	Most SMEs have high maturity and high awareness of KM implementation. 11 % of them have implemented ICT in KMS, 35 % of them have implemented e-business (CRM, TQM, etc.). Only minor of the samples of Finnish SMEs can take the advantage in the term of growth from their KM-related activities.
Zaim, 2006	Organizational and managerial aspects of KM implementation	Roles, Relation of KM Performance and 3 (three) KM Processes (Knowledge Sharing and Distribution, Knowledge Generation and Development, and Knowledge Codification and Storage).	70 employees in IZGAZ	Survey (12 Questions)	The implementation of KM in Izgaz, Turkey is still in infancy level. Knowledge sharing has the most impact. KM processes have great influences toward KM Performance.
Desouza & Awazu, 2006	Organizational and managerial aspects of KM implementation	Size, industry type, KM activities and Processes (Socialization, Externalization, Combination, and Internalization), resource management, and technology.	25 US SMEs	Observation (qualitative)	SMEs manage knowledge not in a similar way as larger organizations. They look for external best practices knowledge (with internet, other successful enterprise) The use of ICT in SMEs mostly limited to process automation and informative purpose ICT is never be used to manage knowledge due to the resource limitation.
Chen, Duan, Edwards, & LehaneY, 2006	Organizational and managerial aspects of KM implementation	Size, roles, business performance, Knowledge Acquisition (external knowledge, internal knowledge) and Knowledge Sharing.	83 UK SMEs	Survey (14 questions sub-questions) and Interview (12 respondents)	Nearly all SMEs (99 %) aware of the importance of inter-organizational knowledge transfer and think that it is the effective way in improving the business performances. The inter-organizational knowledge transfer are mostly done through meeting, getting advice from partners, and dealing with complaints. Some are exchange information with competitors. Almost half of respondents, made mistakes of understanding the customers that are very costly to them. Social and electronic networks are important for knowledge transfer in researched SMEs.

Table 1. Literature Review (Continued)

Bozbura, F. T., 2007	Organizational and managerial aspects of KM implementation	Company Size, Manager Role, Training and mentoring employees, Policies and strategies of knowledge management, Knowledge capturing and acquisition from outside, and Effect of organizational culture.	76 Turkish Manufacturing SMEs	Survey (18 Questions & 7-scale Likert) for senior managers.	Turkish SMEs do not support the knowledge sharing within the company. Most of the SMEs think that knowledge sharing is not crucial for their success. Overall average: 4.1 (1-7 scale). Variables rank: 1. Policies and Strategies of KM. 2. Training and Mentoring Employees. 3. Knowledge Capture and Acquisition. 4. Effect of Organizational Culture.
Jafari, Fathian, Akhavan, & Hosnavi, 2007	Organizational and managerial aspects of KM implementation	size, turnover, assets, KM Activities, training; interactive participation of employees; flat structures in SMEs; and CEO support and commitment,	26 Iranian SMEs in IT field	Survey (10 Questions)	The results also showed that there is no relationship between organizational size and the learning factors of knowledge management (training; interactive participation of employees; flat structures in SMEs; and CEO support and commitment). The use of IT in the KM does not have an important role in knowledge management in researched Iranian SMEs. IT as a tool for facilitating some of their works and processes IT is NOT as an enabler for knowledge management.
Maguire, Koh, & Magrys, 2007	Organizational and managerial aspects of KM implementation	Size, information and communications technology (ICT), Competitive advantage, IS/IT strategy, awareness, and type of systems.	123 UK SMEs (2 Research phases: 59 + 64)	Survey (123 respondents), Interview (30 companies)	Majority of researched SMEs in UK (92 %) have not using implementing KM activities in the firms. SMEs use ICT independently rather than in the integrated manner. Lack of resources in SMEs has effected in the exploitation of the use of ICT. Most of SMEs prefer purchase the commercial systems rather than developing in-house.
Wong, K. Y. 2009	Organizational and managerial aspects of KM implementation	Company Size, Management leadership and support; Culture; IT; Strategy and purpose; Measurement; Organizational structure; Processes and activities; Motivational aids; Resources; Training and education; and Human Resource Management.	Literature review on CSFs on SMEs	Literature Review. Existing studies on CSFs were reviewed and their limitations	The successful of SMEs can be related on how well they manage the knowledge

Table 1. Literature Review (Continued)

Zanjani, Mehrasa, & Modiri, 2009	Organizational and managerial aspects of KM implementation	Company Size, KM Approaches (KM Strategy, KM Tactic, KM Tools)	Literature Review of Strategy and approaches in KM/KMS practices on SMEs.	Literature Review by exploring the existing papers related to the KM practices in SMEs.	were identified.	In order to successfully implement the KM in the SMEs, managers should determine the strategy, tactics, and using the appropriate tools in KM activities.
Valmoham madi, 2010	Organizational and managerial aspects of KM implementation	Size, Management leadership and support, Organizational culture, Information technology, KM strategy, Performance measurement, Organizational structure, Processes and activities, Rewarding and motivation, Removal of resources constraints, Training and education, Human resources management, and Benchmarking	37 academics, consultants and practitioners in KM	Survey (12 Questions: measuring CSFs that applicable to Iranian SMEs)		Means Factors: 4.5 (1-7 scale) The ranks: 1. Management leadership and support 2. Organizational culture 3. KM strategy 4. Removal of resource constraints 5. Processes and activities 6. Human resource management 7. Organizational structure 8. Performance measurement 9. Training and education 10. Information technology 11. Rewarding and motivation 12. Benchmarking

Table 1. Literature Review (Continued)

<p>Nada, N., Ghanem, M., & Mesbah, S., 2012</p>	<p>Organizational and managerial aspects of KM implementation</p>	<p>Size, Kelly's Model (Strategy, Ideas Generation, Ideas Selection, Implementation, and Diffusion.), IBM Model (Innovation Agenda, Leadership and Culture, Collaboration and Partnering, & Business and Technology).</p>	<p>25 Manufacturing Turkish SMEs</p>	<p>Survey and Interview (Measuring Maturity Level using Innovation Management Model (Kelly's Model & IBM Model) Total 58 Questions)</p>	<p>Most of observed Turkish SMEs in the research are lack of innovation strategy, well defined and structured innovation process, and performance assessment.</p>
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CHAPTER 3

RESEARCH MODEL

This research of measuring the KM/KMS practices will be covering the perception/awareness and the measurement of the KM Maturity level. The author has prepared items related to awareness and maturity based on a systematic and comparative scientific literature analysis related to the best practices of KM.

3.1 KM Practices Awareness Research Model

The first model will measure the awareness level of SMEs towards KM. Awareness is having knowledge or perception of a situation or fact (Oxford, 2004). Through this model, the author would like to measure the SMEs perception, the degree of importance of KM, and to understand whether they agree to implement KM in their daily activities and business processes.

To measure the awareness of KM, the author has proposed the model that is based on the work of Becerra-Fernandez, et. al. (Becerra-Fernandez, González, & Sabherwal, 2004) which illustrates how all aspects inter-relate with KM and its technologies including KMS. The author also adopted the Critical Success Factors (CSFs) into the research model (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005) (Akhavan, Jafari, & Fathian, 2006). These are:

- Management leadership and support;
- Culture;
- IT;
- Strategy and purpose;

- Measurement;
- Organizational structure;
- Processes and activities;
- Motivational aids;
- Resources;
- Training and education; and
- Human Resource Management.

This is the resulting model that is used for measuring the KM awareness:

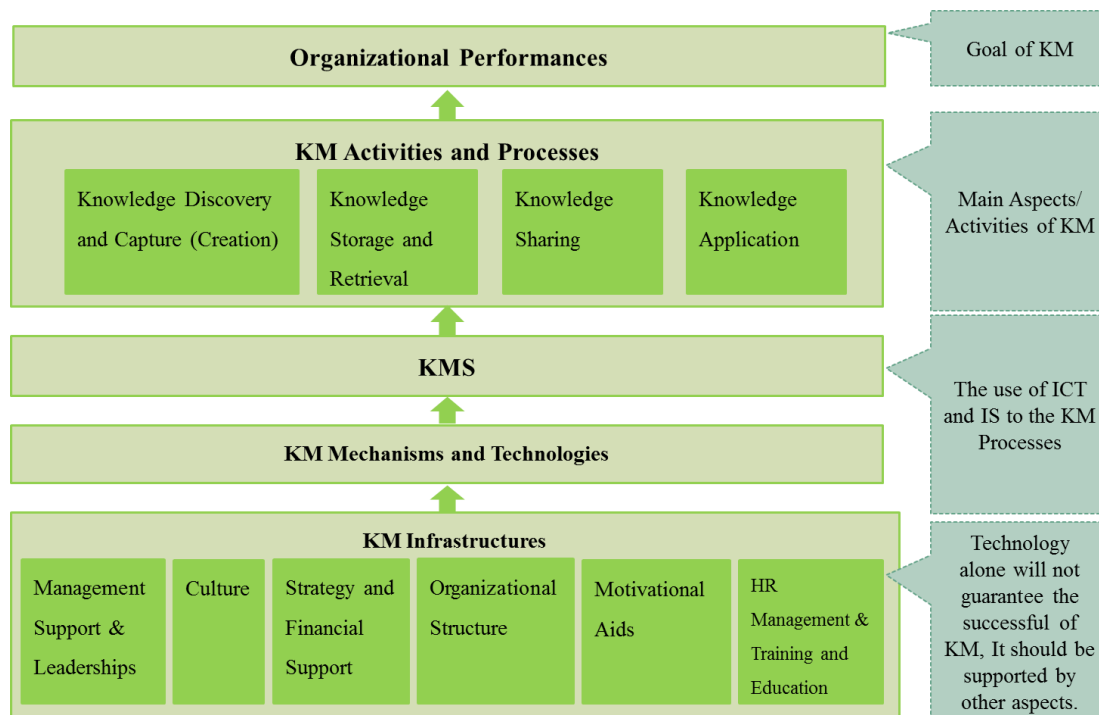


Figure 4. A Modified KM Solution Model (based on Becerra-Fernandez, et. al. (Becerra-Fernandez, González, & Sabherwal, 2004), combined with the Critical Success Factors of KM (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005) (Akhavan, Jafari, & Fathian, 2006))

In Figure 4, we can see that the KM is focused on all activities related to managing knowledge, from its creation, storage and retrieval, sharing, to its application of in order to achieve operational excellence. These days, the integration of ICT/IS is highly related to the KM mechanisms and technologies and could support the KM activities/processes. However, technologies alone will not guarantee the KM activities success. The implementation of KM and KMS should be supported with KM infrastructures, including the support of management and leadership, strategy and financial support, organizational role for KM, supporting organizational culture,

appropriate motivational aids, and human resource management & training and education.

Based on the best practices of the KM illustration above, the author has proposed the research model to be:

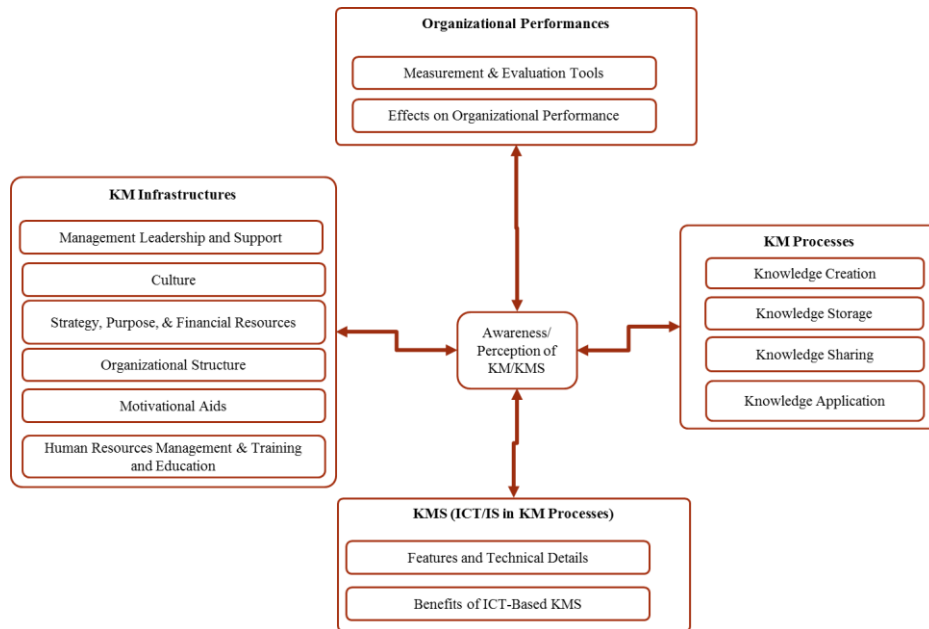


Figure 5. Research Model of KM Awareness/Perception

Table 2. List of Factors and Variables

Factors	Variables
Organizational Performances	<ul style="list-style-type: none"> • Measurement & Evaluation Tools • Effects on Organizational Performance
KM Processes	<ul style="list-style-type: none"> • Knowledge Creation • Knowledge Storage • Knowledge Sharing • Knowledge Application
KMS (ICT/IS in KM Processes)	<ul style="list-style-type: none"> • Features and Technical Details • Benefits of ICT
KM Infrastructures	<ul style="list-style-type: none"> • Management Leadership and Support; • Culture; • Financial Resources; Strategy and Purpose; • Organizational Structure; • Motivational Aids; • Training and Education; Human Resource Management.

3.1.1 Organizational Performance Measurements and the Evaluation of the Implementation of KM and KMS

Organizations need to measure the effectiveness and efficiency of KM/KMS practices regularly and continuously (Chaudhry, What Difference Does It Make: Measuring Returns of Knowledge Management, 2003). The measurement is important so that the organizations be able to show the value of knowledge management application. It is also important to make sure the activities are aligned with the objectives and to track the progress of KM as the evaluation, comparison, control and improvement upon the performance of KM activities (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005).

3.1.1.1 Effects on Organizational Performance

The practice of knowledge management proved in increasing performance of organization. It is already mentioned previously that KM enables organizations to gain organization competitive advantage and to enhance many others advantages such as to produce higher-value goods or services for the firm (Carneiro, 2000) (Coakes, 2003) (Turban, Sharda, & Delen, 2011).

Ruekert, et.al. (as cited by Chang and Chuang) stated that performance can be divided into 3 categories: effectiveness (ratio of output and input, related with performances), efficiency (rate of growth) and adaption (responsive abilities to opportunities and threats) (Chang & Chuang, 2009). Organizations could also measure the effect of KM practices towards organizational performance by looking into financial indicators (profit, revenue growth, investment, capital return ratio) and non-financial indicators (competitive advantage). However, this seems to be difficult since KM practices mostly lead into the indirect benefits and long-term growth and profit (Coakes, 2003).

Items of Effects on Organizational Performance:

1. Enhancing the innovativeness. – KM and Innovation Benefits
2. Gaining competitive advantage. – KM and Competitive Advantages
3. Long-term growth.– KM and Growth Benefits

3.1.1.2 Measurement Tools

The KM practices should be measured for continuous improvement according to the knowledge goals in operational level (short term) and in the strategic level (long-term) of the knowledge goals (Probst, 1998). The knowledge measurement will make some feedbacks related to the KM activities in overall, so that they can be aligned with the KM goals as well as the company's goals.

There are many available tools to measure the performance and the return of investment from knowledge management activities. Chaudry proposed three tools: Balanced Scorecard, Intangible Assets Monitor (IAM) (measuring external, internal, and individual competence), and Skandia's Intellectual Capital Taxonomy & AFS Business Activator (measuring organizational capital, customer capital, human capital, and development/renewal focus) (Chaudry, *What Difference Does It Make: Measuring Returns of Knowledge Management*, 2003). There is also Knowledge Management Maturity Model as the assessment and guidance model for all the companies to measure the KM/KMS practices (Pee & Kankanhalli, 2009).

Items of Measurement Tools:

1. Using evaluation & measurement standard model to evaluate the effectiveness of the KM/KMS. – KM Standard Measurement
2. Improve the KM/KMS based on the previous evaluation. – KM Improvement

3.1.2 KM Processes and Activities

KM consists of multiple activities or known as KM activities or processes. Turban, et. al. define the KM activities are activities that can be related to the KM, which includes knowledge creation, knowledge sharing, and knowledge seeking (Turban, Sharda, & Delen, 2011). Geisler identified that there are four stages of knowledge processing within organizations: generation, transfer, implementation, and absorption. In those activities, there are three types of main actors: generators (people who collect, create, and store the knowledge), transformers (the people who share knowledge to others), and users (the people who absorb, use, and exploit knowledge) (Geisler, 2007). According to Alavi and Leidner, KM consists of four processes: knowledge creation, knowledge storage/retrieval, knowledge distribution, and knowledge application (Alavi & Leidner, *Review: Knowledge Management and Knowledge Management*

Systems: Conceptual Foundations and Research Issues, 2001). Pearson, et. al. defines KM involves four main processes: generation, capture, codification, and transfer knowledge (Pearlson & Saunders, 2006). Becerra-Fernandes, et. al. define knowledge activities consist of knowledge discovery, knowledge capture, knowledge sharing, and knowledge application. However, despite of differences, they are all basically similar, which about creating the knowledge, share it to others, and know how and when to use the knowledge. We can see the graphical relations of those processes:

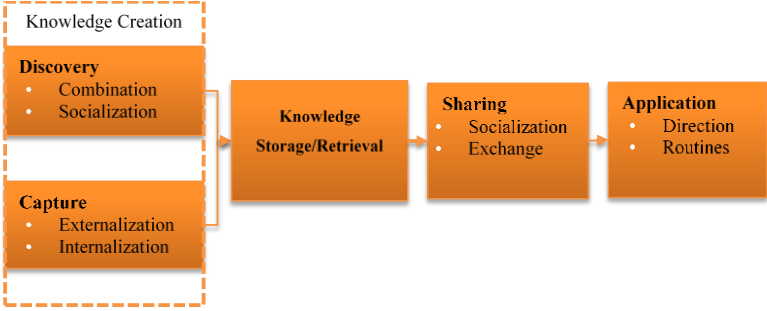


Figure 6. Knowledge Management Activities and Processes

3.1.2.1 Knowledge Creation

Knowledge creation is related with the nature of knowledge and its types. According to Becerra-Fernandez, et. al. (Becerra-Fernandez, González, & Sabherwal, 2004), we can divide knowledge creation into 2: knowledge discovery and knowledge capture. Knowledge discover is creation a new one based on the previous knowledge, while knowledge capture related to the retrieving knowledge that resides on people’s mind. According to Nonaka, knowledge creating process consists of four modes of knowledge conversion: socialization, externalization, combination, and internalization. This is known as SECI model: Socialization, Externalization, Combination, and Internalization (Nonaka, Toyama, & Hirata, Managing Flow: A Process Theory of the Knowledge-Based Firm, 2008) (Nonaka, The Knowledge Creating Company, 2008).

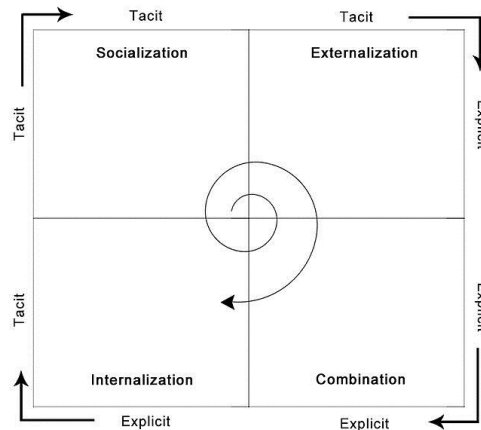


Figure 7. SECI Model

It starts with socialization of individuals, moving to externalization within groups, combination in organizations, and back to internalization in individuals.

- **Socialization.** In this stage, individual tacit knowledge is shared through shared experiences in day-to-day interaction to create new tacit knowledge. There is knowledge transferring through socialization. There is a process of absorbing knowledge through action and perception in this stage.
- **Externalization.** After tacit knowledge collected in the socialization stage, there may be an action to articulate it as explicit knowledge through externalization or conceptualizing process of invisible essence to the visible one. The externalization process is made explicit through language, image, model, and other explicit mode of externalization that can be shared to others. (Nonaka & Hirotaka, *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*, 1995). The conversion of knowledge from tacit to explicit form is critical, time consuming and problematic in knowledge management activities. To do so, it can be done in free form or in more systematically way using knowledge exchange protocol. (Herschel, Nemati, & Steiger, 2001).
- **Combination.** In the combination stage, explicit knowledge from inside and outside is collected, combined, and revised in order to form more complex and systematic sets of explicit knowledge. The refined explicit knowledge is then disseminated across the organization.
- **Internalization.** The explicit knowledge created and shared in the organization is converted to tacit knowledge during the internalization process. In this

process, human can learn and absorb new knowledge, for example, through reading and reflecting deeply on the documents or manuals about something. Internalization is important, which using explicit knowledge to extend one's tacit knowledge base. (Nonaka, The Knowledge Creating Company, 2008).

Knowledge arises from knowledge creation process above will accumulate that become the part of the knowledge assets, which contributes to the generation of corporate value. Knowledge assets include patents, licenses, databases, documents, and other intellectual capitals. These valuable capitals, unlike physical assets, are process rather than substance and always continuously change through the new context of environment and interactions in the knowledge making process. (Nonaka, The Knowledge Creating Company, 2008).

According to Davenport and Prusak, Knowledge, in organization can be generated from dedicated resources by interaction of Research and Development department from their environment, acquisition of other companies, hiring experts, fusion and adaptation of previous knowledge, and networks of people. Knowledge creation is important for business activities and the culture of knowledge creation should be nurtured and encouraged by the managers (Davenport & Prusak, 1998).

Items of Knowledge Creation:

1. Innovate within the enterprise (R&D, marketing, production etc.).
2. Absorb innovation and novelty from outside the enterprise.
3. Make reports and documentation.

3.1.2.2 Knowledge Storage/Retrieval

The storage and retrieval of organizational knowledge refers to the organizational memory (Alavi & Leidner, Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues, 2001). It is related to the knowledge in the past, experience, and events that influence organizational activities. This process is essential in order to keep and reapply viable solutions in the documented form of standards and procedures, which could avoid the similar mistakes, reinvent the wheel, or failed to make good use of organizational resources by redoing the work that have been done previously. The process of

knowledge storage needs a codification of each knowledge, which can be done with the knowledge mapping. (Davenport & Prusak, 1998).

Items of Knowledge Storage/Retrieval:

1. A well-designed central place to store documents and organizational knowledge that every staff can use it.
2. Clearly organized and retrievable firm-related documents and reports.

3.1.2.3 Knowledge Sharing/Transfer

The main goal of the KM often focused on the knowledge transfer where the knowledge can be used at the right time, right place, right person, and even at the right price. Knowledge transfer is the heart of the KM where it shares the knowledge to others (Joshi & Sarker, 2003). Knowledge sharing/transfer can be done in many ways: informal, formal, personal or impersonal. Knowledge transfer also related to the knowledge creation process that have been explained in previous part. Knowledge can transfer from tacit to explicit, explicit to tacit, between individuals, from individuals to groups, across groups, and from group to organization (Alavi & Leidner, Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues, 2001). The success of knowledge transfer depends on the strategies applied by the organization and the organizational culture of knowledge transfer in an organization to tackle any KM issues. (Davenport & Prusak, 1998).

Items of Knowledge Sharing/Transfer:

1. Meetings and discussion to discuss new ideas and results and to share individual knowledge related to work.
2. Collaboration based on all competency of the staff.
3. Formal networks/media for information & knowledge exchange.

3.1.2.4 Knowledge Application

What makes the knowledge becomes the starting point of enhancing the competitive advantage is the application of the knowledge rather than what the knowledge itself (Alavi & Leidner, Review: Knowledge Management and Knowledge Management

Systems: Conceptual Foundations and Research Issues, 2001). Knowledge Application is also related to the concept of organizational learning, as mentioned before, where organization can learn from its surroundings, markets, consumer, and competitors to apply the knowledge at the right time. Regarding the integration of knowledge to create the organizational capability, there are three mechanisms can be done: direction and routines. Direction is the process of giving instruction of other individuals. Routines involve the action to utilize the knowledge embedded in procedures, rules, and norms that guide future behavior (Becerra-Fernandez, González, & Sabherwal, 2004).

Items of Knowledge Application:

1. The use of previous experiences and knowledge to tackle any problems in the firm.
2. The use of previous experiences as the base for decision-making process.

3.1.3 KMS (Knowledge Management Systems)

KMS is the integration of ICT/IS into the Knowledge Management Activities (Alavi & Leidner, Knowledge Management Systems: Issues, Challenges, and Benefits, 1999) (Becerra-Fernandez, González, & Sabherwal, 2004). According to Davenport and Prusak, Technology (ICT/IS) is clearly part of KM (Davenport & Prusak, 1998). Many technologies can be implemented by organizations in order to make the KM process more efficient and effective.

3.1.3.1 Types of KMS

Becerra-Fernandes, et. al. have classified the integration of KMS into four types of knowledge processes: Knowledge Discovery Systems, Knowledge Capture Systems, Knowledge Sharing Systems, and Knowledge Application Systems. (Becerra-Fernandez, González, & Sabherwal, 2004).

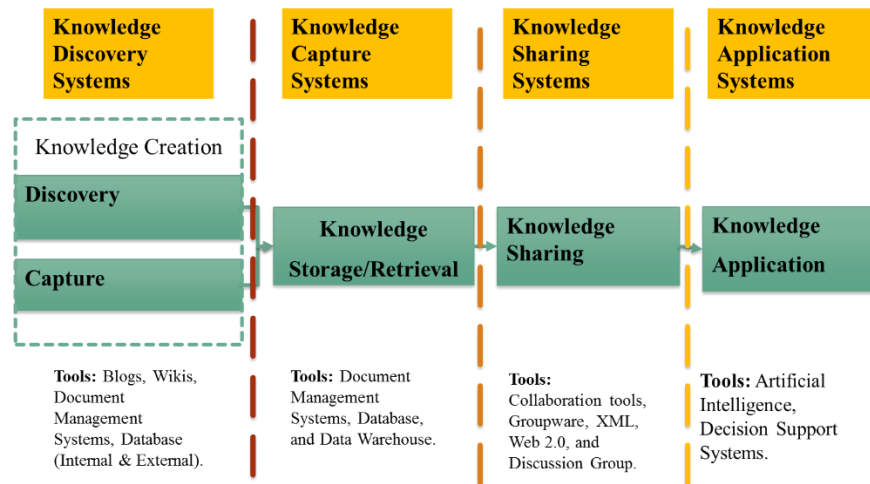


Figure 8. The integration of KMS into KM Activities and Processes

KMS covers wide range of applications, tools, and techniques that can be used in each KM activities and processes. For example, in the Knowledge Discovery Systems, company could use Blogs, Wikis, Document Management Systems, and database to search the existing knowledge to help companies discover and create new knowledge. Document Management Systems, database, and data warehouse also acts as Knowledge Capture Systems or Knowledge Storage Systems that could be used for knowledge storage and retrieval. For Knowledge Sharing Systems, companies could use collaboration tools, discussion, and groupware such as forum and messenger applications. Knowledge Application Systems could help companies in the application of the knowledge for problem solving and decision-making such as Artificial Intelligence, Business Intelligence, Knowledge-Based Systems, and Decision Support Systems (Chaudhry, Enterprise Portals and Knowledge Management Processes, 2004) (Davenport & Prusak, 1998) (Becerra-Fernandez, González, & Sabherwal, 2004) (Turban, Sharda, & Delen, 2011).

3.1.3.2 Benefits of KMS

Tseng mentioned that the main advantage of the integration of IT in KM is an improved ability to recognize and maximize the valuable knowledge for organizational excellences (Tseng, 2008). IT can also help the establishment of knowledge repositories systems. The use of IT can be integrated into the organizational learning since it can be used as a tool for documenting the tacit knowledge. ICT/IS also expands the range of knowledge use and makes the knowledge sharing faster (Revilla,

Rodríguez-Prado, & Prieto, 2009) (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005). KMS is also viewed as novel method to stimulate creativity and innovation by sharing knowledge to other staff.

Items of Benefits of KMS:

1. Enable rapid and faster search, access, and retrieval of information and knowledge in organizations.
2. Could increase significant level of effectiveness and efficiency in organizations.

3.1.3.3 Features and Technical Details of KMS

Generally, KMS consists of two primary functions modules: a module related process management to manage knowledge activities and a content management module to cope with knowledge contents (Park, Kim, & Kang, 2003).

Connectivity and ease of use interfaces are also the main concerns when developing a KMS (Jennex, 2003). Jennex has made a model of KMS success based on the IS Success Model by DeLone and McLean. In the KMS Success Model, Jennex emphasized and recommend four main aspects to be fulfilled by company when implementing the KMS: system quality, information quality, use (satisfaction and amount of use), and the Individual and Organizational Impact. Other important factors that needed to be taken into consideration in the development of KMS are the simplicity and user needs suitability (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005).

One should pay attention to the nature of the target environment of whom KMS is supposed to serve: the roles and organizational functions in an organization. The understandings of target environment could help the development and implementation of KMS (Boahene & Ditssa, 2003). KMS could be used to span and cover all departments, roles, functions, and levels within organizations (Laudon & Laudon, 2012). KMS also covers partial functionalities of e-business and daily operations applications such as SCM (Supply Chain Management) and CRM (Customer Relation Management) (Koh & Maguire, 2004). For example, SCM could help a company in the creation and management of knowledge related to the suppliers and CRM could

help a company with the knowledge related to the customer. KMS should support all staff, functions and all business units according to the access level of the users.

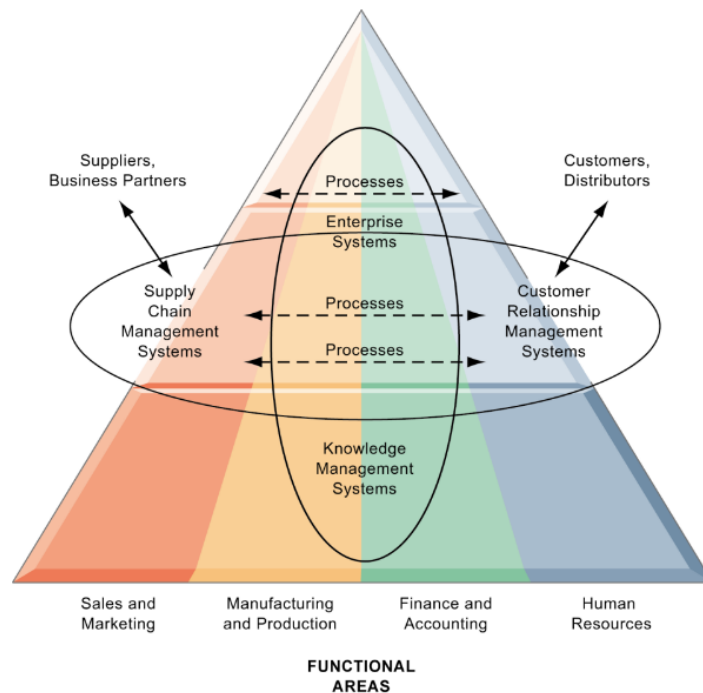


Figure 9. Span of KMS in an Organization. Courtesy of (Laudon & Laudon, 2012)

Organizations should also consider ICT infrastructure whenever implementing the KMS. To achieve the expected goals what ICT could do, there are four important aspects to be considered: how the infrastructure reach all the staff in the organization, how depth it reach, the richness of the benefits of the IT infrastructure, and the aggregation of the infrastructure (Becerra-Fernandez, González, & Sabherwal, 2004).

Items of Features and Technical Details of KMS:

1. KM Systems should be built upon the needs and expectations of the staff.
2. KM Systems Support all staff and be integrated with all business units and business process in our firm.
3. The ICT infrastructure to support the KM activities.

3.1.4 Knowledge Management Infrastructure

Even though ICT is the part of KM, the use of technology alone will not assure you that the KM process will be successful (Davenport & Prusak, 1998). There should not be a rush or always following the trend of the technological advances. It is a fault to think that technology will guarantee the success of KM. To support the success of KM

in the organization, the KM infrastructure should be taken into the account by any managers (Duffy, 2000) (Becerra-Fernandez, González, & Sabherwal, 2004).

3.1.4.1 Management Leadership and Support

KM/KMS practices need manager's commitment and support to ensure continuous support throughout the company (Probst, 1998) (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005). Leaders should be the role model of the behaviors and actions to steer and increase in the participation of employees in the KM/KMS practices.

Items of Management Leadership and Support:

1. The upper management level needs to encourage the staff.
2. The upper management should initiate, support, and commit KM/KMS practices.

3.1.4.2 Organizational Culture

Organizational culture includes the understanding value of KM in all members of organization, which indicates the value and belief that guide the staff members (Becerra-Fernandez, González, & Sabherwal, 2004). Organizational culture in the KM practices covers the collaboration culture that supports the knowledge transfer and innovative culture where every staff member inspired to create new ideas and solutions (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005). There should also be a trust in the organization to fully maximize the use of KM in the organization especially in knowledge sharing (Wang R. , 2003).

Items of Culture (Learning and Innovative Culture):

1. Needs to develop trust, innovative and collaborative culture for growth and creating novelty products and services.
2. Should frequently explore new operational and product development processes.

3.1.4.3 Strategy and financial support

Clear, Comprehensive, and well-planned strategy is significant for the success of KM (Liebowitz, 1999). It includes the shared vision of clear objectives, purpose, and goals for pursuing KM (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005). The organization should have the competitive strategy to support the goals and missions of the company in relation with knowledge management activities (Coakes, 2003).

Financial support is also required as the investment to support the KM practices (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005). The proper allocation of budgeting is critical for the success of KM practices.

Items of Strategy and financial support:

1. Needs clear, well-defined strategy and purpose.
2. KM practices, innovation, collaboration should be incorporated with firm's strategy and vision.
3. Shall allocate a sufficient financial budget.

3.1.4.4 Organizational Structure

Organizational structure covers a special role or department that performing knowledge-related tasks (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005). In Wong's paper, it is called organizational structure. However, to make it less confusing with the infrastructure like hardware and facilities, I changed the definition into organizational structure. Organizational structure could be decentralization and centralization (Becerra-Fernandez, González, & Sabherwal, 2004). Organizations could assign CKO (Chief Knowledge Officer) or the existing functions, such as HRM (Human Resource Management) or IT department responsible for the organization knowledge. It is important to note that every organization has its own effective organizational structure according to the activities and the roles of staff in that organization.

Items of Organizational structure:

1. Specific role of staff that manage knowledge (e.g. Chief Knowledge Officer).
2. Specific department that manage knowledge (e.g. Research and Development, KM department, IT department).

3.1.4.5 Motivational Aids

The reward system in the company could motivate all staff in an organization actively participating in sharing knowledge (Laupase, 2003) (Becerra-Fernandez, González, & Sabherwal, 2004). The rewards could be anything from monetary (such as remuneration) to non-material rewards (such as satisfaction). Laupase, furthermore stated that the reward system is proven to be effective in the more active participations of staff in the knowledge management activities in the organization, especially in the service-based organization, such as consultancy firm (Laupase, 2003). The reward and incentive in the company should be focused on the criteria such as knowledge sharing and contribution, teamwork, creativity, and innovative solutions in order to build knowledge-based enterprise (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005).

Items of Motivational Aids:

1. Needs monetary and non-monetary incentives.
2. Incentive systems based on KM activities.

3.1.4.6 Human Resources Management & Training and Education

Human resource is inevitably important to coordinate and manage the KM practices (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005). The development program, training and education is also important so that the individuals could have better understandings of the concept of KM and improve their skills related to their jobs. Training and education should also covers the creative thinking, innovation skill, and knowledge sharing.

Items of Human Resources Management & Training and Education:

1. Needs a formal education program to introduce the KM concept.

2. Needs training on creative thinking, collaborative skills, problem solving, and documentation skills.
3. Needs employee development program that can improve their skills.

3.2 Extended KM Maturity Model (Based on General KM Maturity Model (G-KMMM))

Pee & Kankanhalli stated that organizations could use KM Maturity Model to assess and guide the organization with the implementation of KM (Pee & Kankanhalli, 2009). There are many types of KM Maturity Models available for the companies to use. Most models divide the stages of the implementation of KM into 4 to 6 maturity levels, albeit with different names. Pee & Kankanhalli said that KM Maturity should meet the following criteria:

- Provide a systematic and structured procedure to ensure the transparency and reliability of assessment.
- Provide qualitative and quantitative results for the organization.
- Comprehensible and allow cross references to proven management concepts.
- Include technology, people, and processes aspects.

Noticing that most of the KM Maturity Models cannot satisfy all the proposed characteristics above, Pee & Kankanhalli proposed the G-KMMM that can satisfy all the aspects in KM: technology, people, and processes. In this study, I am also measuring the maturity levels of KM inspired by the G-KMMM that consists of three KPAs: KM and People, KM Processes, & KM and Technology.

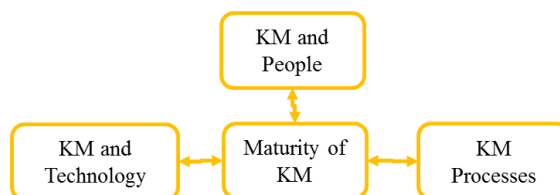


Figure 10. Research Model of KM/KMS Maturity Level

The proposed GKMMM has two main components: maturity level and three Key Process Areas (KPA (people, process, and technology)). Each KPA represents specific aspect in the maturity model.

- KM & People KPA covers aspects related to the organizational culture, strategies and policies.
- KM Processes KPA includes the aspects focused on the KM activities and processes, such as knowledge creation, knowledge storage, knowledge sharing, and knowledge application.
- KM & Technology KPA concerns with the aspects related to the integration of technologies and infrastructure in the KM practices.

All KPAs have a set of characteristics that is used to define the maturity level of organization that we could see in Table 3. There are five maturity levels in each KPA, which started with level 1 or initial to level 5 or optimizing. In order to achieve specific level in the specific KPA, the company should meet the requirements stated in the current level and in the previous ones (if there are any). This practice implies that the company could not skip previous level(s) of maturity to achieve the higher ones. The requirements in each level are designed to be achieved by the company systematically and gradually. The set of questions and statements for the G-KMMM is listed in Table 33 in Appendix C.

Since the questionnaire items in both Awareness and Maturity Level Models are similar, I did the statements alignment and matching, where the statements in awareness is aligned to match the statements in maturity levels. Therefore, we could avoid to ask two similar questionnaire items. The questionnaire alignment and matching is looking at the keywords that match in both models. The process of questionnaire alignment and results of comparison between the original G-KMMM and modified model is provided in Table 33 in Appendix C.

Table 3. KM Maturity Level Model Stages (Pee & Kankanhalli, 2009).

Maturity Level		General Description	Key Process Areas (KPA)		
			People	Process	Technology
1	Initial	Little or no purpose to manage and administer organizational knowledge formally.	Organization and its staff member are not aware of the need of formal KM.	No formal processes to catch, transfer and reuse organizational knowledge.	No specific IT/IS or IT infrastructure for KM.
2	Aware	Organization is aware of and has the intention to implement KM but might not understand how to do so.	Management is aware of the need of formal KM.	Knowledge related to the routine task is documented.	There is Pilot KM projects in place.
3	Defined	Organization has a basic KM support and infrastructure.	<ul style="list-style-type: none"> • Management is aware of its role to encourage KM. • There is a basic training on KM • There is a basic KM strategy. • KM roles are defined. • There is incentive systems. 	<ul style="list-style-type: none"> • There is a formal KM Processes. • The use of metrics to evaluate the productivity due to KM. 	<ul style="list-style-type: none"> • There is a basic KM Infrastructure . • Availability of enterprise-level KM projects.
4	Managed	KM initiatives are well established in the organization.	<ul style="list-style-type: none"> • Standard approach and Common strategy towards KM in organization. • KM is incorporated in organizational strategy • More advanced KM training. 	Quantitative evaluation of KM processes .	<ul style="list-style-type: none"> • Availability of Enterprise-wide KMS • Fair use of KMS. • Integrated KMS and technology with content architecture
5	Optimizing	<ul style="list-style-type: none"> • KM is deeply integrated into the organization and is continually evaluated and improved. • KM becomes automatic component in any organizational processes. 	Culture of sharing is institutionalized.	<ul style="list-style-type: none"> • KM processes are constantly evaluated and improved. • Existing KM processes adapted to meet new business requirements. • KM procedures become an integral part of the organization. 	Existing KM infrastructure is continually evaluated and improved.

3.3 Hypothesis Model

This study would like to measure the awareness and maturity level of KM/KMS practices in Turkish SMEs through the model in previous parts. However, the author also would like to see any correlations or effects of the control variables such as size, age, annual revenue, location, sector, and industry to the KM/KMS practices in Turkish SMEs. The null hypothesis, which shows no relationship between phenomenon, are prepared in this study.

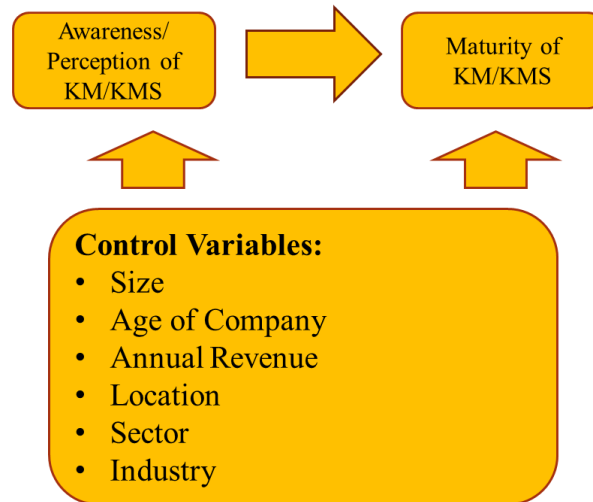


Figure 11. Model of Hypothesis Tests

CHAPTER 4

RESEARCH METHODOLOGY

This study is using mixed-methods approach of both quantitative and qualitative approaches, where the qualitative approach is used after quantitative ones to enable more in-depth exploration of the quantitative data. This approach is called sequential explanatory design (Hesse-Biber, 2010). The mixed-method is also found fit to answer the research questions raised related to this study.

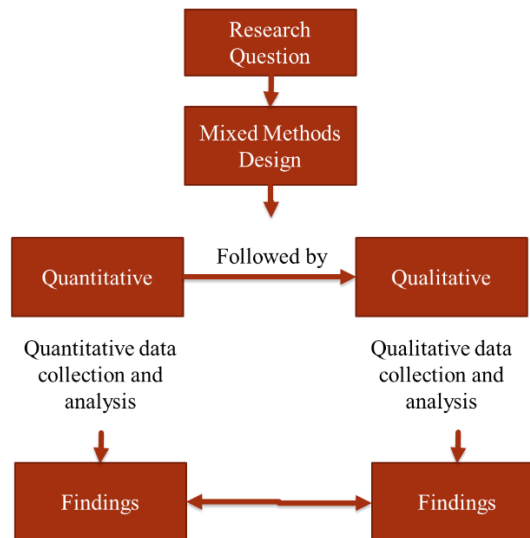


Figure 12. Quantitative > Qualitative Sequential Explanatory Design (Hesse-Biber, 2010)

4.1 Research Phases

This study consist of 8 phases of research, namely:

- Literature Review. In the first phase, the author has searched, reviewed, and summarized most of literatures including online journals, textbooks, and

references relevant to the KM and KMS implementation, including the implementation in SMEs. The literature review is undertaken in order to identify the research gap that have not been done by other researcher or authors.

- Developing Research Model. The literature review is also used to develop the research models that have been explained in the previous parts. There are two research models used in this study that have been explained in Chapter 3: Awareness and Maturity Level Model.
- Developing Questionnaire Statements/Items based on the Models. Composition of the questionnaire needs to be carefully thought and its formulation must be clear. Based on the models developed that are explain in Chapter 3, the author has search the supporting details to be the statements/items in the questionnaire. Each variable supposed to have at least two supporting statements. There is also one negative statement as the control check of any non-valid answer.
- Questionnaire Alignment and Matching. As explained previously in Chapter 3 that there are two research models in this study with similar questionnaire items, there should be alignment of items in the awareness model and the maturity model. This alignment producing two different answer responses that related to both awareness and maturity level models for each statement. For example, most of the items in the Maturity Level of KM People are related closely to the items in the awareness of KM infrastructure, including the management support, organizational culture, motivational aids, Human resources and training, and organizational structure. Most of the items in the Maturity Level of KM Process are closely related with the items in the awareness of KM Activities and Processes. Most of the items in the Maturity Level of KM and Technology are resemble closely in the items of the awareness of KMS. The items in the awareness of Performance Measurement are also in the highest level of each maturity level. Therefore, the author has align the questions in order to prevent asking similar questions in different time. The questionnaire alignment results are provided in Appendix C. The maturity levels for different aspects may vary by one stage but they are similar. This supports our suggestion of aligning the questions for awareness and maturity. There are differences resulted by difficulties in understanding of technical terms and changing conditions happened in our pilot study company.

- **Pretest & Pilot Survey.** The pilot test survey is the initial tests of one or more aspects of research design (Babbie, 1990). It is taken as a pre-test to the draft of questionnaire in two companies to get their feedback and review of the survey on whether there are any ambiguous and unclear questions. The questionnaire was revised and the responses from pilot study participants are discarded.
- **Questionnaire Revision.** The feedbacks from the pilot survey are then considered for the revision of the final form of the questionnaire. The pilot survey has resulted in many changes and improvements to the questionnaire.
- **Data Collection.** Since this study comprises mixed method approach, there are two types of data collection related to the quantitative and qualitative type of data. The quantitative data are used for the majority of the finding followed by the qualitative data as the complement.
- **Data Interpretation and Analysis.** The interpretation and analysis of the data is made according to the research models. There are different type of data analysis for awareness and maturity level that will be explained further in the following part.

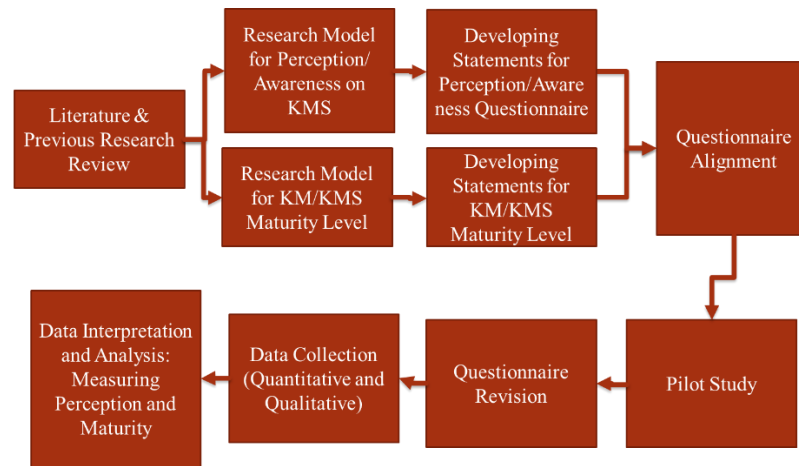


Figure 13. Research Phases

4.2 Quantitative Study

The quantitative approach is prioritized in this study. This part explains the quantitative approach that includes the data collection through survey, sampling design and participants, and data analysis.

4.2.1 Data Collection

The primary data collection is accomplished through survey. Survey consist of asking a large number of people some specific questions or in collecting data about a large number of statistical units. When we conduct a survey, we usually construct a questionnaire, which is the list of all questions we are seeking for answers (Antonius, 2003). In the questionnaire, we are providing scale answers that is using five Likert Scale (Strongly Disagree – Strongly Agree), some nominal for Yes or No questions, and multiple response questions, where the respondents could provide more than one answer at a time.

Respondents were not cued as to what variables the items are measured so as to improve response reliability. However, they are informed about the background of the study, its purposes, as well as private concern statements as described in informed consent, confidentiality, absence of relationship of authority, and freedom to withdraw at any time to follow ethical guidelines according to the ethical principles.

We develop a paper-based and an online survey. Online Survey is used since it is easier to follow up, more convenience, cost-effective, faster, and many other advantages to collect the data (Rea & Parker, 2005). The limitation regarding the online survey is that the writer cannot force any feedback from it, where some respondents may just ignore the questionnaire. The other biases related to the online data collection are access limitation, self-selected, difficult to estimate (hidden population). However, online survey is considered as a good enough, especially when there are time and resources limitation. (Matthews & Ross, 2010).

The paper-based survey is spread in the METU Technopark from October 1st – October 14th, 2013. Some of them would like to take the questionnaire and return the days after. In addition, some rejected to fill them for various reasons. Only 25 usable responses in this phase.

Since the number of responses from the printed questionnaire is very small, the questionnaire is done through online survey. The online questionnaire is spread from October 2013 – February 2014. The list of emails of 1799 companies are collected through the websites of technoparks all over Turkey. There are also some notifications of those invalid email addresses that are failed to send. The number of responses of

online questionnaire is 130. It makes the total responses of printed and online questionnaire to be 155.

Due to the missing data and inconsistency of the responses, we ignored and excluded some of the questionnaires in the data analysis. Since the research is about Small and Medium Enterprises (SMEs), the author has eliminated some of the responses from the large enterprises as well. As the result, 120 questionnaire responses (printed and online) could be analyzed in this research. Totally, the response rate is 6.67 %. The details of the respondents are shown in Table 4.

Table 4. Location and Response Rate of the Respondents

City	Technoparks	Number of Companies	Number of Usable Response	Response Rate
Ankara	Ankara University	43		
	Bilkent University	198		
	Hacettepe University	125		
	METU	287		
	Gazi University	56		
Total: Ankara		709	52	7.33%
Istanbul	Istanbul Technical University	83		
	Marmara University	45		
	Yildiz Technical University	99		
	Gosb Technopark	111		
Total: Istanbul		338	22	6.51%
Izmir	Iztekgeb	82	10	12.20%
Kayseri	Erciyes University	99	9	9.09%
Bursa	Ulutek	82	6	7.32%
Kocaeli	Kocaeli University	86	2	2.33%
Kahramanmaras	Sutcu Imam University	12	4	33.33%
Konya	Selcuk University	96	3	3.13%
Sakarya	Sakarya Technopark	9	3	33.33%
Eskisehir	Anadolu Teknoloji Technopark	26	2	7.69%
Denizli	Pamukkale University	32	2	6.25%
Trabzon	Trabzon Technopark	39	2	5.13%
Malatya	Inonu University	5	2	40.00%

Table 4. Location and Response Rate of the Respondents (Continued)

Isparta	Suleyman Demirel University	33	1	3.03%
Antalya	Akdeniz University	25	0	0.00%
Mersin	Mersin University	51	0	0.00%
Trakya	Trakya University	35	0	0.00%
Erzurum	Ata Technopark	12	0	0.00%
Elaziğ	Firat University	28	0	0.00%
Total		1799	120	6.67%

4.2.2 Sampling Design

The sampling design is a detailed plan on how to get the sample of research object, which describes the variety of sample, the list of segments from the sample that will be selected and the method of acquiring them (Antonius, 2003).

Since this study will measure the awareness and the maturity level of KM/KMS practices in Turkish SMEs, the author is also tried the best to get the best representation of sample from all around Turkey since the aim is to generalize, which the population of the study is the whole SMEs in Turkey. However, the study towards the whole population is almost impossible, takes time and requires high cost to complete. Therefore, the number of samples are chosen in order to represent the whole population of Turkish SMEs. In order to get a valid representation, the author has proposed the sampling design carefully.

The probabilistic samples technique will require much effort to find the list of SMEs to get the respondents since the sample should be random. Therefore, in order to minimize the cost with more sensible and convenient way, the author choose the non-probabilistic sample as the way to select the respondents. The non-probabilistic sampling is suitable for a research with a limited time and resource (Antonius, 2003).

The selection of The Turkish SMEs in the Technology Parks is considered as a combination of purposive (selecting sample based on the knowledge about the population), convenient (require little effort to get an access to them) and criterion (meeting criterion of interests) non-probabilistic sampling (Matthews & Ross, 2010) (Bailey, 2007) (Babbie, 1990) (Antonius, 2003). Even though non-probabilistic samples thought to be more biased since the selected samples could have some

characteristics that set them apart from the whole population (Antonius, 2003), there are reasons why the author has chosen the SMEs in the technoparks as the object of the research. The reasons for the sampling design are also related to the characteristics of the Technopark itself (Muhasebe Rehberi, 2014) (WebRazzi, 2012):

- Technopark is the technological development zone prepared for university-industry collaboration created in 2001.
- Since there are no tax for those companies in the technoparks, most of the firms are Small and Medium Enterprises or branches from the large ones.
- Most of the companies are running in the research and development, which is knowledge-intensive companies.
- Technoparks are also available in most of the parts in Turkey, especially in the universities spread across Turkey. The wide spread of technoparks could increase the representation of SMEs in Turkey in this study.
- Even though, most of the companies in technoparks are technology-related companies, there are also various type of sectors and industries (multi-sector and multi-industry) of companies.
- Close connection between universities and technoparks has made the easier access where the author could gather data and any other for the research purposes related to SMEs in technoparks.
- Technoparks are the places for the knowledge transfer between Education institutions and the business institution that could make the result of the research more usable in the academic and real world business in the future.

4.2.3 Respondents Details

This part explains the demographic details of the respondents. Firstly, the respondents are divided into the roles: Owner, Manager, Staff, and Other. There is no specific level of managers since most of SMEs are having flat organizational structure. There are six respondents in N/A category, in which the respondents that are not answering the role part.

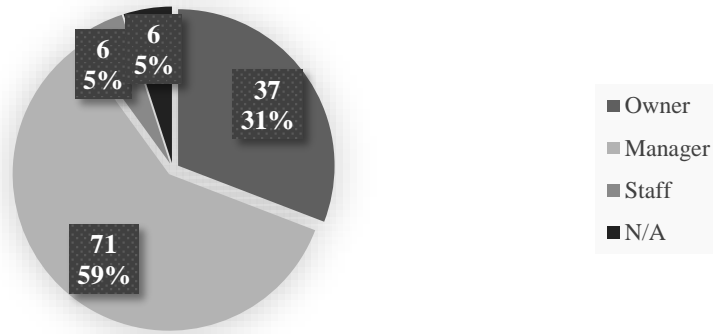


Figure 14. Roles of Respondents

Qualtrics, the online survey service that I am using, support the geographical coordinates of the respondents by recording the location of the internet provider. According to the data, the respondents are dispersed to almost all cities in Turkey, with Ankara that has the most frequent number of respondents.

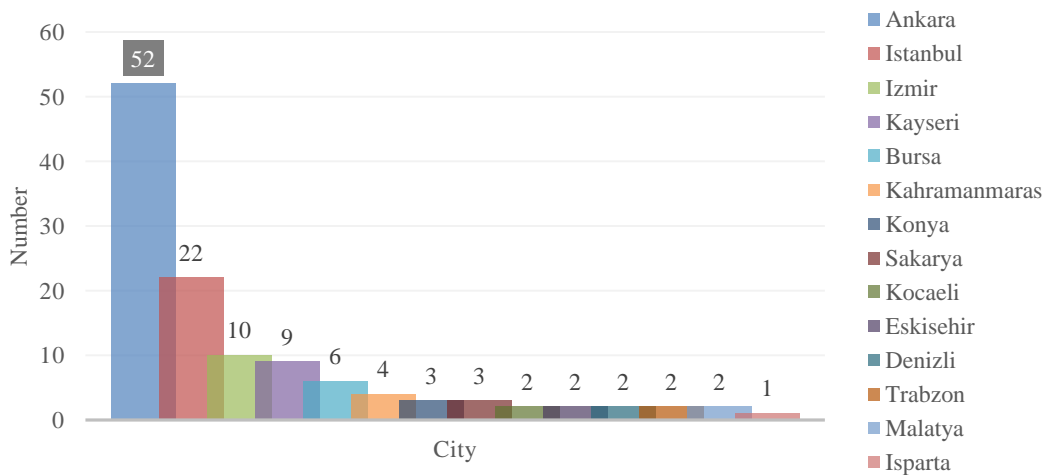


Figure 15. Location of Respondents

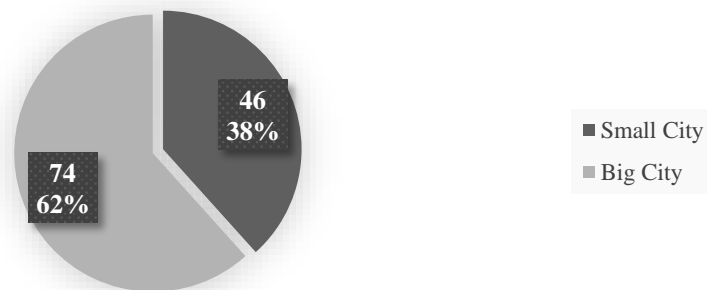


Figure 16. Category of Location of the Companies

In Figure 15, we could see the distribution of the city of the researched companies, which is based on Table 4. Location and the Response Rate. Since this study will also

investigate on the correlation of the location and awareness and maturity level of KM/KMS practices, I have simplified the location into two categories: Small and Big cities. The three biggest cities in Turkey, related to the size and population are: Istanbul, Ankara, and Izmir. However, Izmir only has one technopark that consist of less than 100 companies. Therefore, related to the number of technopark and its companies, Izmir is categorized as small city. Companies would be categorized as in the big city if they were located on either Istanbul or Ankara. The rest is categorized as in the small city. The number of respondents related to the category is shown in Figure 16.

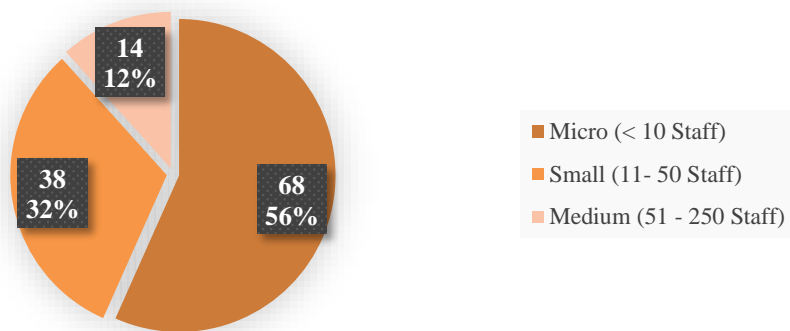


Figure 17. Size of Companies

From the graph in Figure 17 above, we could see the percentage of the size of the companies. The size of companies is based on the number of employees. Companies that have less than 10 employees or micro companies is the majority with 56% or 68 respondents. The Small Enterprises (11-50 employees) is 32 % with 38 respondents. The rest is the Medium Enterprises (51-250 employees) with 12 % with 14 respondents.

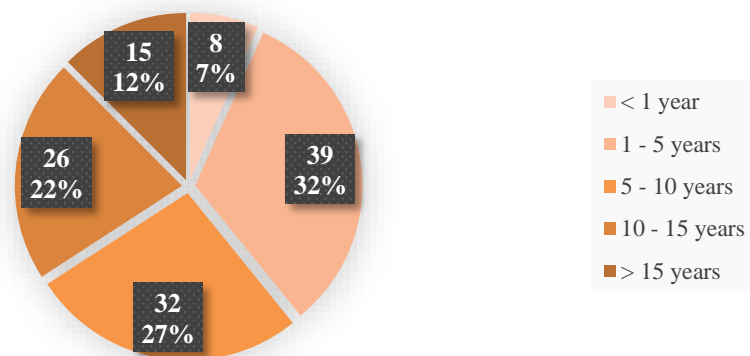


Figure 18. Age of Companies

According to Figure 16, the number of age of companies is vary. The majority of the respondents is the companies with the age of 1-5 years with the number of 39 or 32 % of the total respondents, followed by the companies with age of 5-10 years, which is 26 % with 31 respondents. The companies with the age of 10-15 years are reaching 22 % with the number of 27. There are 15 long-run companies with more than 15 years of experiences or 13 %. The startup companies or the companies with the age of less than 1 year is only 7 % or eight companies.

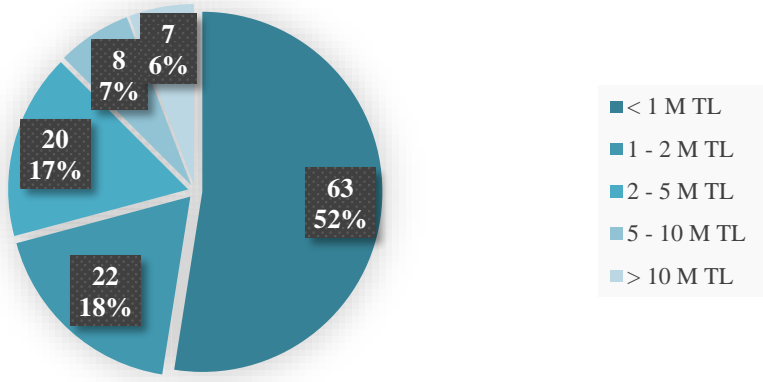


Figure 19. SMEs Annual Revenue

From Figure 17, we could see that most of the respondents have annual revenue less than 1 Million Turkish Lira with the number of 63 or 52 %. The ranks followed by the companies with the annual revenue of 1-2 Million Turkish lira with 22 companies or 18 %, 2-5 million TL with 20 companies or 17 %, 8 companies or 7% have 5-10 Million TL, and 7 companies or 6 % that have more than 10 Million TL.

I have tested the correlation between size, age, annual revenue, and location of the researched SMEs. The results is in Appendix A. Most of them are significantly positive correlation, especially for the size, age, and annual revenue of the companies. It means that the bigger company, the older and the higher annual revenue they have. There is one insignificant correlation between age and location. We can safely assume that the location of old or startup companies are spread across big and small cities. Related to the size and annual revenue, most of the big and high annual revenue companies are located in the big cities.

We also asked the sector and industry type in the questionnaire. The questionnaire questions of sector and industry are asked with the multiple choice type of questions in order to absorb the details of the companies that are multi-sectors or multi-

industries. There are some of the companies where they manufacture products as well as selling it and provide services in regards to their products.

SPSS converts multiple responses with the code of each available answer. The unanswered responses are recoded with 0 and answered responses with 1. However, the mixed type answer of of sector and industry cannot be used for direct correlation of the awareness and maturity level of KM since there are possibilities that the exact same respondent could be correlated in the analysis. For example, the company with mixed industry of IT and Health are automatically included in the analysis of three different type of sectors: IT, health, and mixed IT & Health in SPSS.

For further analysis of correlation of sector and industry towards KM awareness and maturity level, we recoded the multiple responses into single responses as shown in Figure 20. We also correlate the KM awareness and maturity level towards sector and industry in Appendix E and F by excluding the mixed responses sample data.

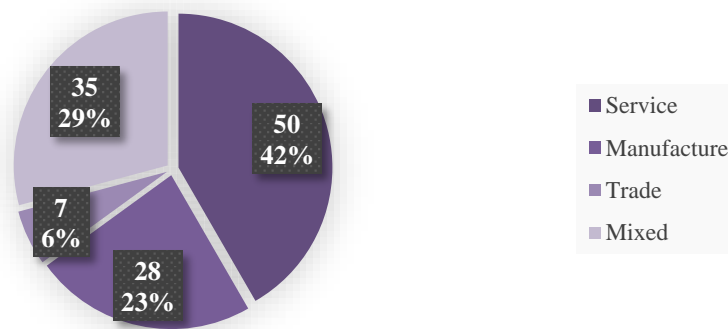


Figure 20. Sector of Company

Table 5. Number of Mixed Sector

Mixed Sectors	N
Service * Manufacture	15
Service * Trade	6
Manufacture * Trade	1
Service * Manufacture * Trade	13
Total	35

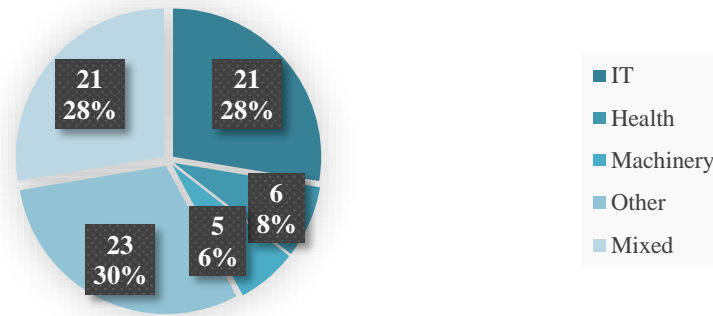


Figure 21. Industry of Company

Table 6. Number of Mixed Industry

Mixed Industry	N
IT * Health	4
IT * Machinery	3
IT * Other	6
Health * Machinery	2
Health * Other	1
Machinery * Other	1
IT * Health * Machinery	2
IT * Health * Other	1
IT * Machinery * Other	1
Total	21

In Figure 20 & 21 and Table 5 & 6, we could see that most of respondents are in the service sector with 50 companies or 41 %. For the industry, most of the researched companies are running in the IT industry with 66 or 55 %. The other industry are the industry with less than 3 respondents. There are automotive, textile, food and agriculture, publishing and design, electronic, architecture, projects and R&D, education, energy, travelling and tourism, advisory (consultant), recycling, robotics, aerospace engineering, and chemistry.

4.2.4 Data Interpretation and Analysis

The data analysis for quantitative data is mainly divided into two sections: Awareness/Perception Analysis and Maturity Level Analysis since both of them have different way of analysis. All of the quantitative data are then put in the SPSS for the analysis. There are also correlation and significance analysis sections to make comparisons and to draw conclusions for further analysis.

Data collected in the SPSS are analyzed with statistical analysis resulting both descriptive and inferential statistics. The main quantitative data were summarized, described, interpreted, and analyzed using spreadsheet method, which produced illustrated diagrams as well as conclusive descriptive texts. Descriptive Statistics aims at giving description of a condition by summarizing important information. Inferential statistics, in the other hand, aims at inferring some numerical character of a population when only a sample is given. It implies of margin of error and a probability of error, based on representative samples (Antonius, 2003).

4.2.4.1 KM/KMS Awareness/Perception Analysis

The first step of the data analysis is to know the level of awareness/perception of SMEs toward the practice of KM/KMS. The items related to the KM/KMS awareness/perception are measured with the Likert Scale from very disagree – very agree. The answers are then converted into numbers from 1 (Very Disagree) to 5 (Very Agree). At the first stage of the analysis for the awareness/perception, all values regarding to each variable are counted to know the average. After that, the data are shown in the form of charts. This type of analysis is done with SPSS and Ms. Excel that considered as common for the quantitative type of data (Antonius, 2003). The further explanation about awareness/perception is shown in Chapter 5.

In the research model, we could see that there are variables with different number of items of statements. However, there is no weighted means measurement for specific variables. The variables that are having more items are treated the same with variables that are having less items. Even though the means are not weighted, the results is not significantly different from the weighted ones.

Reliability Analysis

The reliability analysis takes the evaluation of the Cronbach's alpha values to show the consistency of the items in the questionnaire. The reliability analysis is undertaken only for awareness/perception type of questions.

The results of the reliability analysis for all items is 0.938, which is considered as a high level of internal consistency. The reliability analysis for each variable are also above 0.7, which also high.

Table 7. Reliability Analysis Results

Factors	Items	Cronbach's Alpha
Overall	34	0.938
Organization Performance Awareness/Perceptions Reliability Analysis	5	0.888
KM Activities and Processes Awareness/Perceptions Reliability Analysis	10	0.791
Knowledge Management Systems Awareness/Perceptions Reliability Analysis	5	0.907
KM/KMS Infrastructure Awareness/Perceptions Reliability Analysis	14	0.879

4.2.4.2 KM Maturity Level Analysis

The data for items related to the KM maturity level is analyzed with the universal way of measuring maturity levels. There are rules to be followed in the maturity level analysis. Since, this study use Pee and Kankahalli's model as the base, we do the measurement of maturity levels according to each KPA in their model (Pee & Kankanhalli, 2009).

In the G-KMMM used in this study, there are five levels of Maturity Level (1-5) in three KPAs (Key Process Areas) including KM and People, KM Processes, and KM & Technology that is already shown in Table 3 in Chapter 3. The higher maturity level, the better of KM practices. To qualify for a maturity level, a company should carry out the practices described of that level. All the questions in the maturity level are using the No or Yes, which is converted into zero or one.

There is no requirements in the lowest level of maturity. Therefore, if the companies failed to meet any requirements in all level, the company will automatically get the level one or the lowest maturity of KM practices. To get the level two of maturity, all practices in the level 2 should be carried out in the company. To get the level 3, all practices in level 2 and 3 should be carried out, and so on. The same rules applied until the highest level 5 of maturity level, where all items (from level 1-5) should be satisfied.

To achieve the results, the author used IF (Boolean) formula in the SPSS to emulate the rules. The formula used is checking from the highest to the lowest of maturity level:

- If all items in the level 2 - 5 are satisfied, the maturity level is five.

- If all items in the level 2 - 4 are satisfied, the maturity level is four.
- If all items in the level 2 - 3 are satisfied, the maturity level is three.
- If all items in the level two are satisfied, the maturity level is two.
- Else, the maturity level is one.

4.2.4.3 Hypotheses Testing

I do the hypothesis testing in this study by observing the statistical significance value generated from the SPSS (v.21). Statistical significance is the level of risk of the acceptance or rejection and the statement about the likelihood and possibilities of the observed result (Antonius, 2003) (Matthews & Ross, 2010). It is designed to provide a measure the probability of the relationships found in the data from the sample that will also be found in the wider population. It is denoted by α (alpha), sig., or p-value. It is recommended to use significance value at 0.05 (5%). It means that if the significance values were less than 0.05, the result would be statistically significant, therefore, the null hypotheses (no relationship between two variables) can be rejected.

We could also look at the correlation analysis to see any changes, responses, and effects of factors related to others (Crano & Brewer, 2001). To achieve those goals, I did the correlation analysis. This kind of analysis could give the information in the degree and type of relationship. It could also measure the strength of an association (Antonius, 2003). Pearson correlation coefficient (r) could indict the magnitude and direction of the relationship. The value of r may vary from -1.00 (inverse/negative) to +1.00 (positive).

However, regression and correlation could not be used to interpret cause and effect relationship (University of Oregon, 2014). The cause and effect must be based on the judgment of the analyst, in this case, with the help of literature review and qualitative analysis.

4.3 Qualitative Study

The qualitative approach is taken to give more depth data analysis to the quantitative ones.

4.3.1 Data Collection

The qualitative approach data is collected through the open-ended question in the questionnaire that can be answered freely by the respondents. The question in the questionnaire is:

- Do you have any other comments or suggestions regarding the KM/KMS practices or regarding this questionnaire?

There are 8 companies answered the question above.

Table 8. Details of Respondents that Answering the Open-Ended Question

Org.	Role	Sector	Industry	Size	Age	Annual revenue	Location
1	Owner	Manufacturing	Other, (Project)	Micro (<10 staff)	5-10 years	< 1 M TL	Izmir
2	Owner	Manufacturing	IT, Electronic	Micro (<10 staff)	5-10 years	< 1 M TL	Ankara
3	Owner	Manufacturing	IT, Electronic, Health, R & D	Micro (<10 staff)	1-5 years	< 1 M TL	Isparta
4	R & D Manager	Service	IT	Small (11 – 50 staff)	1-5 years	< 1 M TL	Istanbul
5	Owner	Service, Manufacturing	Machinery	Micro (<10 staff)	1-5 years	< 1 M TL	Kocaeli
6	General Manager	Service, Manufacturing	IT, Machinery, Robotic	Small (11 – 50 staff)	1-5 years	1 – 2 M TL	Istanbul
7	R & D Manager	Service, manufacturing, Trading	Other (Textile, Chemistry)	Micro (<10 staff)	< 1 year	< 1 M TL	Kahramanmaraş
8	Owner	Service, manufacturing, Trading	Health, Machinery	Micro (<10 staff)	1-5 years	< 1 M TL	Denizli

There is also a question of contact details in the questionnaire, so that a follow-up study will be conducted for further data collection.

The follow-up study was conducted through structured interview by email to get further details of the practices of KM/KMS. The interview that is done in the study is the structured interview, where the time is scheduled and expected to take a specific amount of time. There is also a guide and pre-defined questions that are asked to the respondents in the similar way (Babbie, 1990). The follow up interview of the study is undertaken to capture their experiences related to the KM/KMS practices.

When contacting through emails, the author has explained the previous phase of the research and the temporary result related to the company. The questions in the follow-up study are related to the results of the research. The follow-up study questions are in Appendix G. Out of 15 companies that provided email contacts, only one respondent joined the follow up study. However, it has been very insightful and provided us with enlightening feedbacks.

4.3.2 Data Interpretation and Analysis

The data interpretation and analysis for qualitative approach requires making sense of the data, consists of several activities: break it down, study its components, investigate its importance, interpret its meaning. To do that, the author has done coding and memoing that are iterative processes (Babbie, 1990). Coding is the process of organizing large amount of data into smaller segments that can be retrieved easily. Memoing is the writing of memos to oneself regarding insights one derives from coding and reflecting on the data.

The results of qualitative data analysis through questionnaire are presented in Table 9. The results of follow up study are presented in Chapter 5 to provide deeper understandings related to specific parts of this study.

Table 9. Coding of Open Ended Question

Codes	Categories	Statements
More Effective and Efficient.	KMS (Benefits)	Organization 1: Such systematized applications can make an organization easier and more efficient to do the job. In the term of growth, but self-sufficient companies, however, can be performed at certain times and do believe when required.
Good to Share Knowledge, Ethics of Knowledge Sharing	Knowledge Sharing	Organization 2: It is good to share information , but it is bad to steal information. But people should know the ethic of knowledge sharing .
Need of support	Management Support, Motivation, Triggers	Organization 3: Need for support .
Specific department	Knowledge Application	Organization 4: KMS is more suitable for knowledge sharing in selling and marketing department .
Difficulties, Financial Resources Problem.	Resources (Financial)	Organization 5: Implementation of these systems is very important but for SMEs, a little difficult to implement due to financial reasons .
Prioritization	KMS, Strategy	Organization 6: The use of Information technology is currently not maximized in all over Turkey. It is only used whenever needed. There should be prioritization .

Table 9. Coding of Open Ended Question (Continued)

Ease of use, Cost, Extra Training.	KMS	Organization 7: Instead of using professional program in KM, office and other simple programs are more suitable for micro-sized businesses. It is related to the cost and ease of use of the application. There will be a need for an extra training to make an advantage of those complex KMS.
Usefulness, Benefits.	KMS (Benefits)	Organization 8: KMS applications are important. However, the usefulness of those apps is questionable.

CHAPTER 5

DISCUSSION

KM/KMS PRACTICES IN TURKISH SMES

5.1 KM Practices Awareness: Descriptive Results

The overall results for the KM Practices awareness are shown in Table 10.

Table 10. Dimensions of Model of KM Practices Awareness

Dimensions of the KM Awareness model and its variables	Mean
<i>Organizational Performance</i>	4.11
Measurement Tools	3.98
Effects of Organizational Performance	4.24
<i>KM Activities and Processes</i>	4.42
Knowledge Creation	4.38
Knowledge Storage	4.47
Knowledge Sharing	4.35
Knowledge Application	4.47
<i>Knowledge Management Systems (KMS)</i>	4.17
Benefits of KMS	4.18
Feature of KMS	4.16
<i>KM Infrastructure</i>	4.04
Management Leadership and Support	4.31
Organizational Culture	4.50
Organizational Strategy & Finance	4.14
Organizational Structure	3.56
KM Motivational Aids	3.80
Human Resources Management, Training and Education	3.91

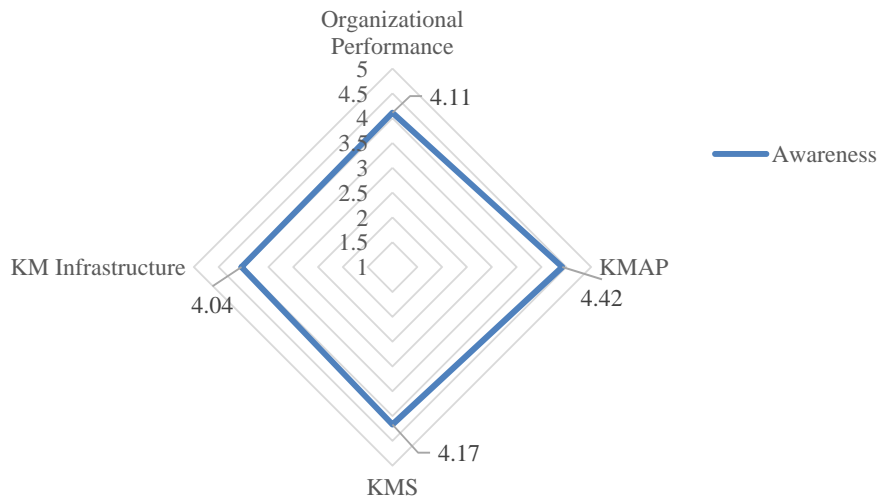


Figure 22. Awareness Factors Results

The results shows that the average of all aspects in the awareness are above level four (1 – 5 Likert scale). Therefore, we could conclude that most of the researched companies are highly aware of the big components of KM practices. The method of measuring the awareness could also be used to see the degree of important of aspects in KM practices. Therefore, the data collected through the survey also enable us to rank of the importance of items of KM practices. The rank of awareness of the factors is provided in Table 11.

Table 11. Rank of Awareness Factors

Rank	Factors	Mean	S.D.
1	KMAP	4.42	0.38
2	KMS	4.17	0.62
3	Organizational Performance	4.11	0.62
4	KM Infrastructure	4.04	0.54

We could also see the details of the awareness in Figure 23.



Figure 23. KM Practice Awareness Variables Results

This is the ordered list of the highest awareness to the lesser ones:

Table 12. Rank of Awareness Variables

Rank	Variables	Mean	S.D.
1	Organizational Culture	4.50	0.60
2	Knowledge Storage	4.47	0.57
3	Knowledge Application	4.47	0.57
4	Knowledge Creation	4.38	0.47
5	Knowledge Sharing	4.35	0.48
6	Management Leadership and Support	4.31	0.70
7	Effects of Organizational Performance	4.24	0.66
8	Benefits of KMS	4.18	0.65
9	Feature of KMS	4.16	0.64
10	Organizational Strategy & Finance	4.14	0.63
11	Measurement Tools	3.98	0.71
12	Human Resources Management, Training and Education	3.91	0.73
13	KM Motivational Aids	3.80	0.84
14	Organizational Infrastructure	3.56	1.00

From Table 12, we could see that organizational culture is the aspect of KM practices that are the most preferred. Organizational culture consists of statements related to the development of collaboration and innovative culture. In the second until the fifth are the KM activities themselves. Management Leadership and Support is in the sixth. The least preferred are Measurement tools, HR management, motivational aids, and organizational structure.

I think why culture is the most important in the SMEs is because the heart of KM is the collaboration and innovative culture that should be developed first in Turkish SMEs. According to Becerra-Fernandez, et.al., the organizational culture and human factors hold 80% of the percentage of the success of KM, while the rest of 20% is supported by technology (Becerra-Fernandez, González, & Sabherwal, 2004).

We could also relate the least awareness of organizational structure, motivational aids, and Human Resources Management, Training & Education with resource availability in SMEs. Most of SMEs are having characteristics of having simple and flat organizational structure, limited human and financial resources. Therefore, they are less aware of and less agree with those resource-related variables to be implemented in their companies.

The results above could be compared closely to the Valmohammadi's study which is measuring the importance of Critical Success Factors of KM in Iranian SMEs (explained in Table 1) (Valmohammadi, 2010). In his study, Management Leadership and Support is considered as the most critical factor in Iranian SMEs, while Organizational Culture is seen as the second most important. From 12 CSFs studied, organizational structure is at the seventh in that study.

Another close comparison could be made to Bozbura's study, which is measuring the KM practices in Turkish SMEs (explained in Table 1) (Bozbura, 2007). However, that measurement is having different variables, where the exact comparison is difficult to do. In overall, most of researched Turkish SMEs in Bozbura's study are having close to the mid-point average of the related aspects in the KM. By comparing the results, there is an increasing awareness of aspects related to the KM practices in Turkish SMEs. Furthermore, the researched manufacturing Turkish SMEs in Bozbura's study think that Policies and Strategies of KM are the most, but the effect of organizational culture is the least important. Our results for Turkish SMEs are similar to those of Salojarvi, et.al. in Finland, where there is high awareness of KM (Salojarvi, Furu, & Sveiby, 2005).

5.2 KM Practices Awareness and Size, Age, Annual revenue, & Location of Company

In this part, the author tests the correlations between size, age, & annual revenue and the awareness of KM practices.

Table 13. Correlation Matrix of Size, Age, Annual revenue, and Location of Company towards Variables of Awareness

Factor	Variable	Size of Company		Age of Company		Annual revenue		Location	
		r	Sig.	r	Sig.	r	Sig.	r	Sig.
Org. Performance	Measurement Tools	.002	.985 ns	.057	.536 ns	.004	.966 ns	-.153	.096 ns
	Effects of Org. Performance	-.120	.191 ns	-.051	.584 ns	-.058	.529 ns	-.116	.206 ns
KMAP	Knowledge Creation	-.050	.588 ns	-.021	.817 ns	-.083	.370 ns	-.074	.424 ns
	Knowledge Storage	-.055	.552ns	.000	.997 ns	-.014	.877 ns	.005	.958 ns
	Knowledge Sharing	-.036	.694 ns	-.046	.616 ns	-.047	.613 ns	-.249	.006**
	Knowledge Application	-.033	.718 ns	.007	.941 ns	.034	.712 ns	-.222	.015*
KMS	Benefits of KMS	-.067	.469 ns	.032	.732 ns	.012	.900 ns	-.028	.760 ns
	Feature of KMS	-.024	.797 ns	.047	.607 ns	.028	.763 ns	-.058	.528 ns
KM Infra-structure	Management Leadership and Support	-.032	.730 ns	.018	.848 ns	.038	.682 ns	-.057	.538 ns
	Organizational Culture	-.249	.006**	-.258	.004**	-.213	.019**	-.139	.130 ns
	Organizational Strategy & Finance	.022	.813 ns	.111	.227 ns	.119	.195 ns	-.275	.002**
	Organizational Structure	.059	.522 ns	.051	.581 ns	.065	.483 ns	-.114	.214 ns
	KM Motivational Aids	-.073	.428 ns	.045	.623 ns	-.067	.467 ns	-.205	.024*
	HR Management, Training and Education	-.024	.792 ns	.055	.554 ns	.071	.443 ns	-.263	.004**

NS. Not significant. **. 0.01 Significant level (2-tailed). *. 0.05 Significant level (2-tailed).

In the details of each variable of the awareness presented in Table 13, we could see that there are partial significant correlations that are size, age, and turnover towards the awareness of the importance of the Organizational Culture. We could also see that location has significant impacts on the awareness of knowledge sharing, knowledge application, Org. Strategy and Finance, KM Motivational aids, and HR Management, Training and Education. There are only eight statistically significant difference out of total 56 of the correlation analysis (at 0.05 significance level) between KM practice variables with the size, age, annual revenue, and location of the company.

Significant Correlations

In this part, we are investigating further on the significant correlations of the variables in the awareness through means comparison through ANOVA.

Table 14. Significant Correlation of Size of Company towards Variables of Awareness

	< 10 Staff (N=68)		11 - 50 Staff (N=38)		51 - 250 Staff (N=14)		t	r	Sig.
	Mean	S.D.	Mean	S.D.	Mean	S.D.			
Org. Culture	4.61	0.50	4.45	0.63	4.14	0.79	-2.788	-.249	.006**

** .01 Significant level (2-tailed). * .05 Significant level (2-tailed).

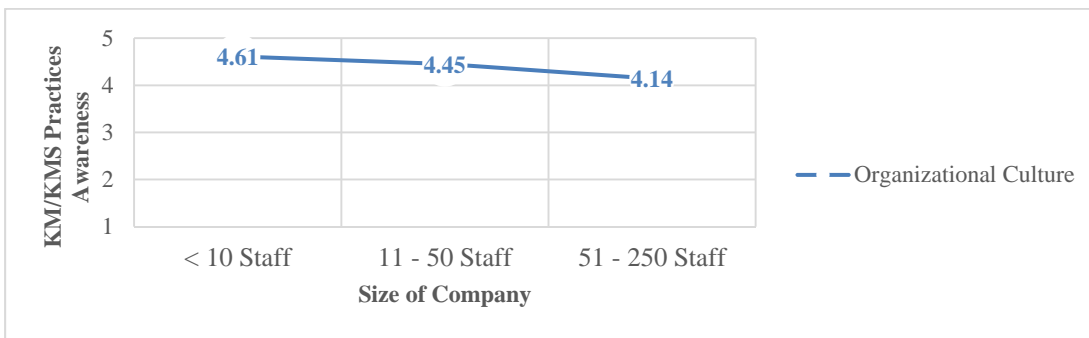


Figure 24. Means Plot of Significant Correlations between KM Practice Awareness and Size of Company

Table 15. Significant Correlation of Age of Company towards Variables of Awareness

	< 1 Year (N=8)		1 - 5 Year (N=39)		5-10 Year (N=32)		10-15 Year (N=26)		>15 Year (N=15)		t	r	Sig.
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.			
Org. Culture	4.75	0.46	4.67	0.43	4.50	0.60	4.29	0.62	4.33	0.84	-2.900	-.258	.004**

** .01 Significant level (2-tailed). * .05 Significant level (2-tailed).

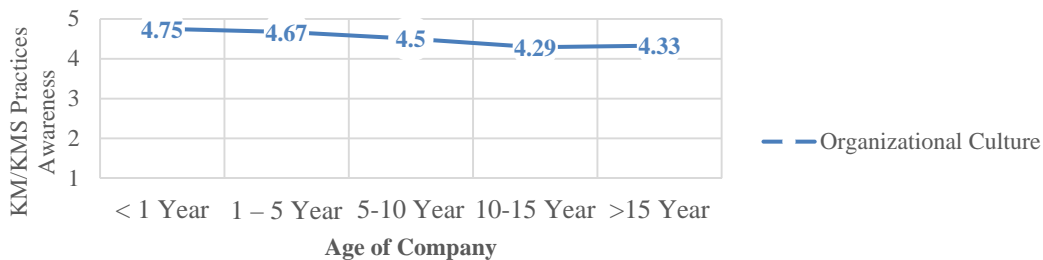


Figure 25. Means Plot of Significant Correlations between KM Practice Awareness and Age of Company

Table 16. Significant Correlation of Annual revenue of Company towards Variables of Awareness

	< 1 M TL (N=63)		1 – 2 M TL (N=22)		2 – 5 M TL (N=20)		5 -10 M TL (N=8)		> 10 M TL (N=7)		t	r	Sig.
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.			
Org. Culture	4.60	0.51	4.52	0.73	4.43	0.49	4.19	0.53	4.21	1.04	-2.371	-.213	.019*

** .001 Significant level (2-tailed). * .05 Significant level (2-tailed).

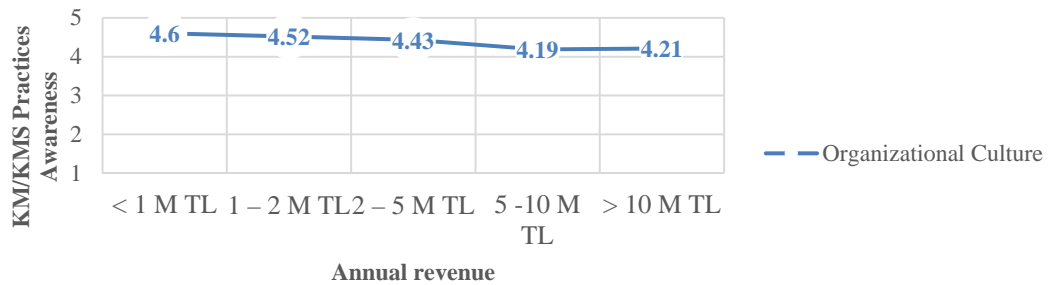


Figure 26. Means Plot of Significant Correlations between KM Practice Awareness and Age of Company

From Table 14 – 16 and Figure 24 – 26, we could conclude that the larger size of the companies, the less consideration of the awareness of the Culture in the surveyed companies. It also happens in the age and annual revenue of the companies where they are showing negative correlations. As have been mentioned earlier in the construct model (Chapter 3), the organizational culture consists of two items related to the collaborative culture & innovative culture (R&D for new products/services). The significant correlation is high on the innovative culture that continuously researching for new ideas, products, and services. Developing innovative culture is also highly important to all companies according to the result. However, those activities are costly. There are some medium companies that convenient with their current business practices. Therefore, continuous R&D for new products and services is less necessary for them. Therefore, we could see the negative correlation for this part.

According to the follow up study, medium and better-established companies prefer to do settled activities for their business. They tend to maximize the previous activities they did instead of researching for innovation and novelty product/service that are highly risky to them. In smaller companies, they need to survive by investing for innovation to compete with other companies. However, even though it seems

significant, the follow up study clarifies that the organizational culture (collaborative and innovative culture) is important in all size of companies.

This result also approves Bozbura’s study, in which there is item related to culture of company related to KM (Bozbura, 2007). Culture item in Bozbura’s study covers the teamwork and collaboration, knowledge sharing and transfer, and encouraging environment to develop ideas (innovation). Bozbura’s study informs us that the small enterprises do not really understand the meaning, use, and importance of organizational culture and that renders the degree of perception high. The medium enterprises understand the meaning of culture well but they think that the culture aspect in KM is less vital for them. In Jafari, et.al.’s study over 26 Iranian SMEs in IT industry, organizational culture has not been selected as a variable. They did not find any effect of the size of the company on the awareness of learning factors of knowledge management namely: training, interactive participation of staff, flat structures in SMEs, and CEO support and commitment (Jafari, Fathian, Akhavan, & Hosnavi, 2007).

Table 17. Significant Correlation of Location of Company towards Variables of Awareness

	Small City (N=46)		Big City (N=74)		t	r	Sig.
	Mean	S.D.	Mean	S.D.			
Knowledge Sharing	4.50	0.49	4.26	0.45	-2.792	-.249	.006**
Knowledge Application	4.63	0.51	4.37	0.59	-2.470	-.222	.015*
Organizational Strategy & Finance	4.36	0.53	4.01	0.65	-3.107	-.275	.002**
KM Motivational Aids	4.02	0.89	3.67	0.78	-2.281	-.205	.024*
Human Resources Management, Training and Education	4.15	0.70	3.76	0.71	-2.957	-.263	.004**

** .01 Significant level (2-tailed). * .05 Significant level (2-tailed).

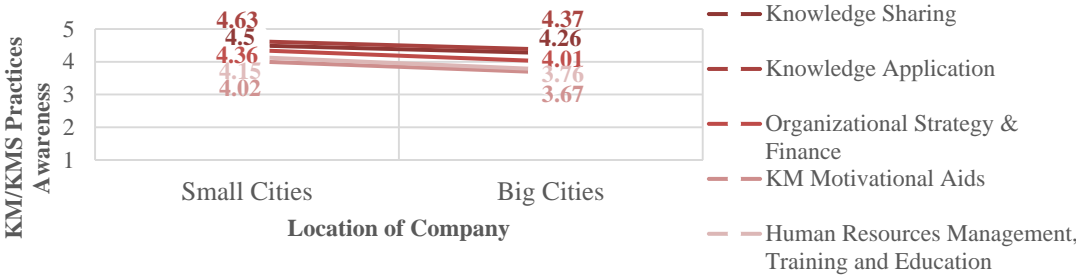


Figure 27. Means Plot of Significant Correlations between KM Practice Awareness and Location of Company

From Table 17 and Figure 27, we could understand that location also has significant impacts on five variables of KM practices awareness, including the Knowledge Sharing, Knowledge Application, Org. Strategy and Finance, KM Motivational Aids, & HR Management, Training and Education. We should point out that all of the correlations are negative, which means that the companies in the big cities are less aware of the variables above, compared to ones in the smaller cities.

According to the follow up study, the companies in bigger cities actually understand and aware of the KM practices. However, there are possibilities that they become pragmatic and skeptical towards KM practices, where they encounter in their daily life, which makes them less aware.

5.3 KM Maturity Level: Descriptive Results

The maturity level is tied closely on the level of the current practices of KM and KMS in every company. In this study, I was inspired by G-KMMM model for KM Maturity Level measurement that consist of three KPAs (Key Process Areas): KM and People, KM Process, & KM and Technology. As mentioned previously, there are five maturity levels: Initial, Aware, Defined, Managed, and Optimizing in each KPA that should be satisfied in order to fall into specific maturity level.

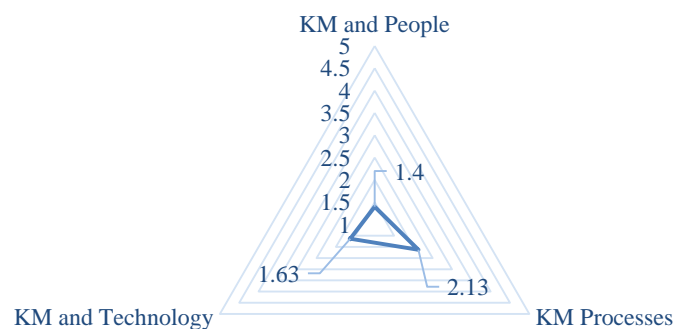


Figure 28. Overall Maturity Level

The spider graph in Figure 28 above shows us that the average of maturity level in the three aspects of the researched enterprises are very low, which is close to the base level. In the maturity level of KM and people, the average is 1.4. The maturity level of

KM processes is having the average of 2.13, while the average of maturity level of KM and technology is 1.63.

We could see the details of the maturity level in Figure 29 - 30.

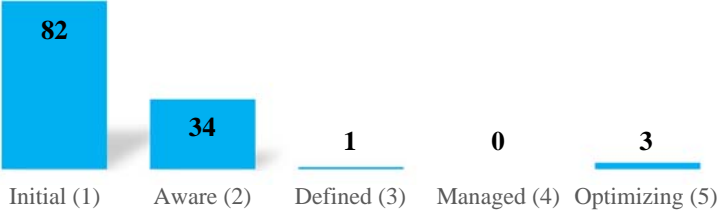


Figure 29. Number of company in Maturity Level of KM and People

Figure 29 above shows us that in the category of maturity of KM and people, the majority of the number is in the initial (1) maturity level with 82 companies.

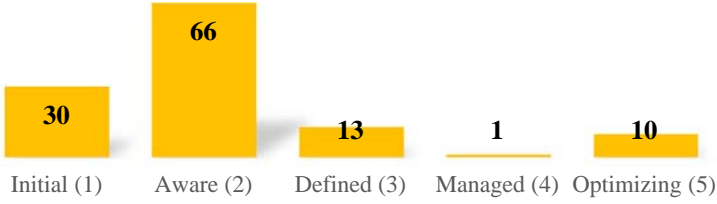


Figure 30. Number of company in Maturity Level of KM Processes

Figure 30 above informs us the number of companies in each level of maturity of KM Processes. It shows us that most of the companies are in the aware level with 66 enterprises. There are also 10 companies in the Optimizing (5) level.

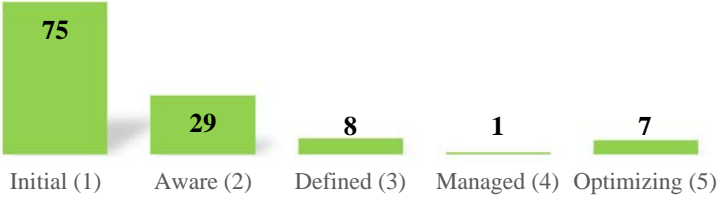


Figure 31. Number of company in Maturity Level of KM and Technology

For the maturity level of KM and technology, most of the companies are still in the Initial (1) level with the number of 75. Twenty-nine companies are having Aware (2) level, 8 companies in Defined (3) level, one company in Managed (4) level, and 7 companies in Optimizing (5) level.

We could compare the results with the results of Zaim’s study in Izgaz, an energy company in Turkey, where the KM practice is still in an infancy level (Zaim, 2006). Even though using different scale of measurement, we can draw the conclusion that Izgaz is not taking KM into full consideration company’s activity integration. Therefore, this study could approve the Izgaz company study, where not so many Turkish SMEs that have been implementing KM practices. The study by Salojarvi, et. al. could also made us compare our results and the maturity level of KM in Finnish SMEs, where it shows us that Finnish SMEs are high mature.

The low maturity level also could mean that the KM practices in the researched SMEs are not well planned nor guided. Most of the KM maturity model including the G-KMMM are using the conditional rules, where to reach specific level of maturity; all of the aspects need to be currently implemented. In the real practices, there are many companies that are not implementing KM practices in the fully manner.

5.4 KM Maturity Level and Size, Age, Annual revenue, & Location of Company

In this part, the author tests the correlation between Maturity Level of KM and the size, age, annual revenue, & location of company.

Table 18. Correlation Matrix between KM Maturity Level and Size, Age, Annual revenue, & Location of Company

KPA	Size of Company		Age of Company		Annual revenue		Location	
	r	Sig.	r	Sig.	r	Sig.		Sig.
KM and People	.155	.092 ns	.074	.420 ns	.160	.081 ns	.170	.063 ns
KM Processes	.280	.002**	.239	.008**	.379	.000**	.287	.002**
KM and Technology	.366	.000**	.127	.168 ns	.349	.000**	.294	.001**

NS. Not significant. **. 0.01 Significant level (2-tailed). *. 0.05 Significant level (2-tailed).

Table 18 above shows us that all of independent variables, such as size, age, annual revenue, and location, insignificantly affect the maturity level of KM and People. However, we could see that all of them are positively correlated. In the other hand, all of the independent variables (size, age, annual revenue, and location) have positive significant affecting the maturity level of KM Processes. Size, annual revenue, and location of the company are affecting the maturity level of KM and Technology. In

contrast, the age of company is insignificantly affecting the maturity level of KM and Technology. All of the independent variables does not significantly affecting the KM and People. In total, there are six statistically significant difference out of 12 correlations (at 0.05 significance level) between size, age, annual revenue, and location and the KM maturity level.

Significant Correlations

We will further investigate the significant correlation by looking at the means differences.

Table 19. Significant Correlations between Size of Company & KM Maturity Level

KPA	< 10 Staff (N=68)		11 - 50 Staff (N=38)		51 - 250 Staff (N=14)		t	r	Sig.
	Mean	S.D.	Mean	S.D.	Mean	S.D.			
KM Processes	1.91	0.91	2.24	1.20	2.86	1.10	3.172	.280	.002**
KM and Technology	1.34	0.61	1.84	1.26	2.50	1.56	4.277	.366	.000**

** .01 Significant level (2-tailed). * .05 Significant level (2-tailed).

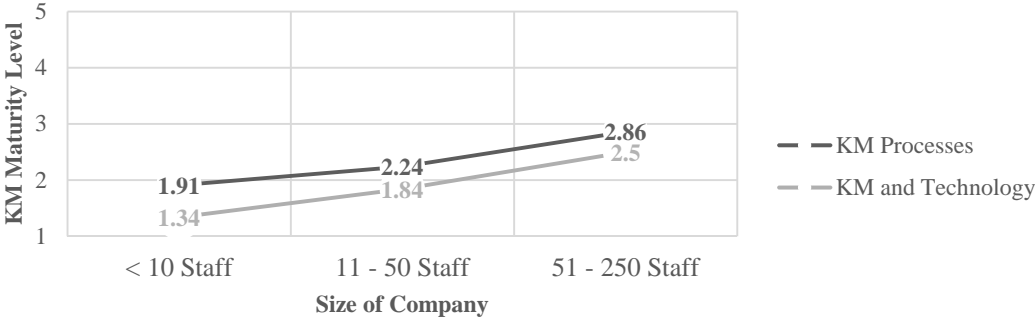


Figure 32. Means Plot of Significant Correlations between KM Maturity Level and Size of Company

The size of company has significant impact on the KM Processes and KM and Technology. From the means difference shown in Table 19 and Figure 32, we could conclude that the bigger companies, the higher maturity level of KM Processes and KM and Technology. The positive correlation is not surprising, since companies would have implementing better options in the KM processes and its technology with more availability of the resources.

Table 20. Significant Correlations between Age of Company & KM Maturity Level

KPA	< 1 Year (N=8)		1 – 5 Year (N=39)		5-10 Year (N=32)		10-15 Year (N=26)		>15 Year (N=15)		t	r	Sig.
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.			
KM Processes	2.00	0.76	1.77	0.63	2.28	1.20	2.15	1.08	2.73	1.49	2.679	.239	.008*

** . 0.01 Significant level (2-tailed). * . 0.05 Significant level (2-tailed).

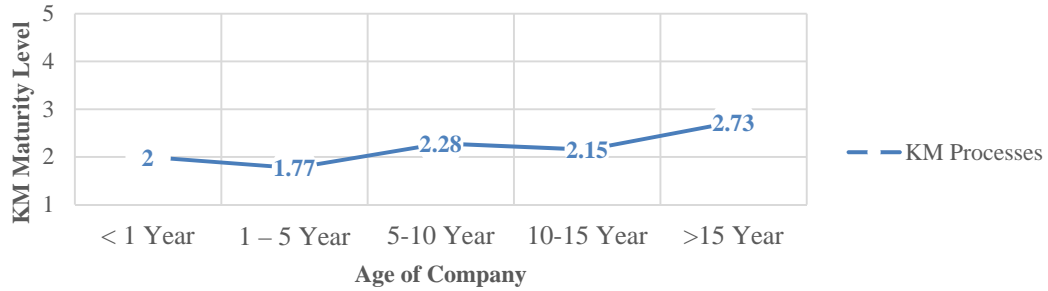


Figure 33. Means Plot of Significant Correlations between KM Maturity Level and Age of Company

We can draw some conclusions based on Table 20 and Figure 33 that the age of company has significant impact in the maturity level of KM Processes. With the company getting older, their KM processes practices are also become more mature. The results are also not surprising since companies that are getting older could learn the needs regarding the KM processes that fit best with their conditions.

Table 21. Significant Correlations between Annual revenue & KM Maturity Level

KPA	< 1 M TL (N=63)		1 – 2 M TL (N=22)		2 – 5 M TL (N=20)		5 -10 M TL (N=8)		> 10 M TL (N=7)		t	r	Sig.
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.			
KM Processes	1.83	0.83	2.05	0.90	2.50	1.36	3.00	1.41	3.00	1.00	4.451	.379	.000**
KM and Tech.	1.32	0.62	1.77	1.38	2.00	1.34	1.88	0.64	2.71	1.60	4.043	.349	.000**

** . 0.01 Significant level (2-tailed). * . 0.05 Significant level (2-tailed).

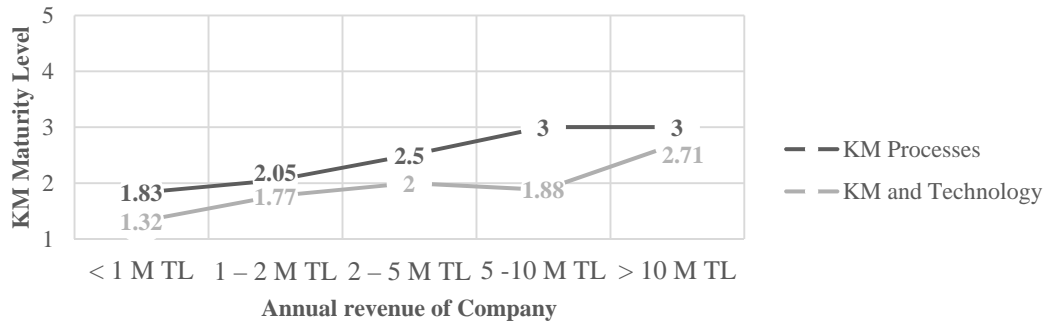


Figure 34. Means Plot of Significant Correlations between KM Maturity Level and Annual revenue of Company

The annual revenue of company has a very high positive significant effect on the maturity level of KM Processes and KM and Technology. We can infer from the results that whenever they have more financial resources, it will also increase their support on the KM activities and its technology.

Table 22. Significant Correlations between Location & KM Maturity Level

KPA	Small City (N=46)		Big City (N=74)		t	r	Sig.
	Mean	S.D.	Mean	S.D.			
KM Processes	1.74	0.85	2.36	1.12	3.251	.287	.002**
KM and Technology	1.24	0.52	1.88	1.23	3.345	.294	.001**

** .001 Significant level (2-tailed). * .05 Significant level (2-tailed).

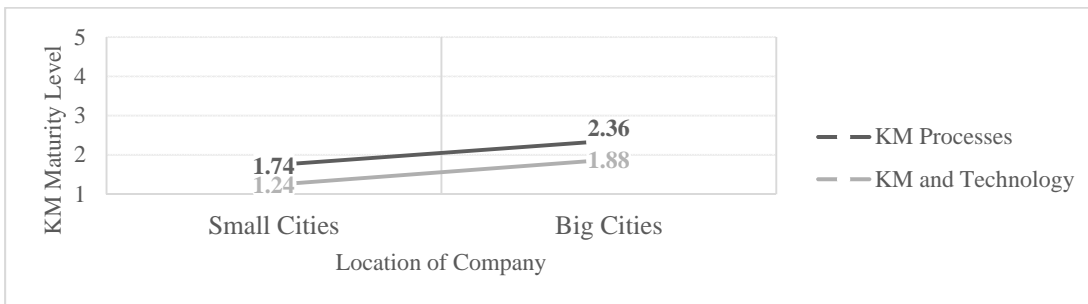


Figure 35. Means Plot of Significant Correlations between KM Maturity Level and Location of Company

Based on the results on Table 22 and Figure 35, we could see that the location of the company also has positive significant impact on the maturity level of KM Processes and KM and Technology. As shown in Appendix A that location is significantly correlated with resources, therefore, it is also not surprising since companies in bigger cities are having more resources. As the results, the maturity levels are also higher in bigger cities.

5.5 KM Awareness and Maturity Level

In this part, I am investigating further the correlation of the KM practices awareness variables and KM maturity level Key Process Areas (KPA).

Table 23. Correlation Matrix between Variables of Awareness and & Maturity Level of KM

Factor	Variable	Maturity Level of KM and People		Maturity Level of KM Processes		KM and Technology	
		r	Sig.	r	Sig.	r	Sig.
Org. Performance	Measurement Tools	.195	.033*	.192	.035*	.104	.259 ns
	Effects of Org. Performance	.158	.084 ns	.137	.137 ns	.017	.857 ns
KMAP	Knowledge Creation	.140	.127 ns	.060	.518 ns	.081	.378 ns
	Knowledge Storage	.107	.245 ns	.069	.455 ns	-.130	.157 ns
	Knowledge Sharing	.091	.323 ns	.045	.622 ns	.034	.710 ns
	Knowledge Application	.057	.536 ns	.006	.948 ns	-.011	.906 ns
KMS	Benefits of KMS	.236	.009**	.154	.092 ns	.165	.072 ns
	Feature of KMS	.265	.003**	.212	.020*	.187	.041*
KM Infrastructure	Management Leadership and Support	.155	.091 ns	.162	.078 ns	.046	.618 ns
	Organizational Culture	.100	.278 ns	-.001	.993 ns	.056	.546 ns
	Organizational Strategy & Finance	.180	.049*	.140	.126 ns	.131	.154 ns
	Organizational Structure	.191	.036*	.036	.696 ns	.193	.035*
	KM Motivational Aids	.179	.050*	.032	.726 ns	.108	.242 ns
	Human Resources Management, Training and Education	.076	.408 ns	-.029	.754 ns	.037	.686 ns

NS. Not significant. **. 0.01 Significant level (2-tailed). *. 0.05 Significant level (2-tailed).

By seeing Table 27, we could know that there are 10 statistically significant difference out of 42 correlations (at the 0.05 significance level) in the correlation analysis between variables of KM awareness and the maturity level of KM.

Significant Correlations

In this part, I further analyze the significant part of the correlation from the previous part by seeing the means differences.

Table 24. Significant Correlation between Variables of Awareness and & Maturity Level of KM and People

Variable	Initial (1) (N=82)		Aware (2) (N=34)		Defined (3) (N=1)		Optimizing (5) (N=3)		t	r	Sig.
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.			
Measurement Tools	3.87	0.73	4.22	0.58	5.00	-	4.17	0.76	2.161	.195	.033*
Benefits of KMS	4.08	0.66	4.37	0.57	5.00	-	4.67	0.58	2.638	.236	.009**
Feature of KMS	4.04	0.66	4.37	0.52	5.00	-	4.67	0.58	2.983	.265	.003**
Org. Strategy & Finance	4.06	0.62	4.30	0.58	4.67	-	4.44	0.96	1.988	.180	.049*
Org. Structure	3.48	1.02	3.65	0.91	5.00	-	4.50	0.50	2.117	.191	.036*
KM Motivational Aids	3.73	0.87	3.91	0.74	3.50	-	4.67	0.29	1.979	.179	.050*

** .01 Significant level (2-tailed). * .05 Significant level (2-tailed).

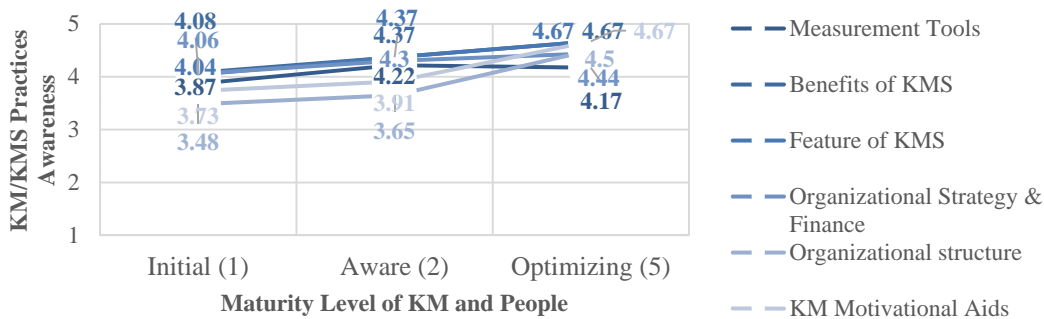


Figure 36. Means Plot of Significant Correlations between Maturity Level of KM & People and KM Practices Awareness

Table 24 shows us that the maturity level of KM and people are affected by six variables of KM practices awareness. All of them are having positive correlations meaning that the higher awareness of companies, the companies are likely to increase their KM and people maturity level. In Figure 36, I have hidden the Defined maturity level of KM and People since there is only one respondent.

Table 25. Significant Correlation between Variables of Awareness and & Maturity Level of KM Processes

Variable	Initial (1) (N=30)		Aware (2) (N=66)		Defined (3) (N=13)		Managed (4) (N=1)		Optimizing (5) (N=10)		t	r	Sig.
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.			
Measurement Tools	3.82	0.77	3.99	0.70	4.04	0.59	3.50	-	4.40	0.57	2.130	.192	.035*
Feature of KMS	4.11	0.71	4.08	0.62	4.33	0.54	3.33	-	4.67	0.47	2.360	.212	.020*

** .01 Significant level (2-tailed). * .05 Significant level (2-tailed).

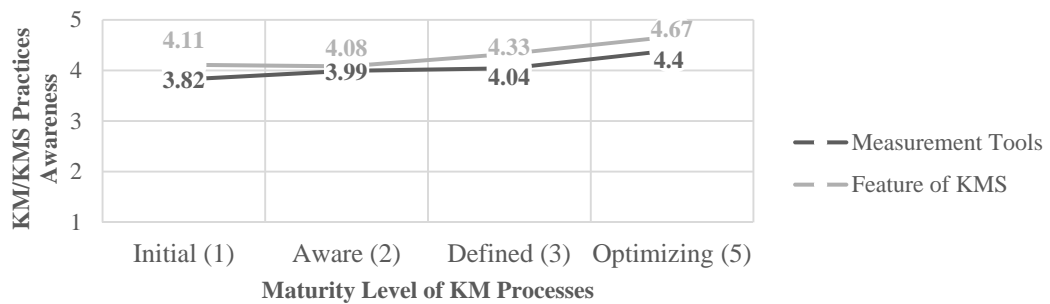


Figure 37. Means Plot of Significant Correlations between Maturity Level of KM Processes and KM Practices Awareness

Table 25 shows significant correlations that the awareness on Measurement Tools and Feature of KMS have positive impact on the KM Processes maturity level. In Figure 37, I have hidden the Managed maturity level of KM Processes since there is only one respondent.

Table 26. Significant Correlation between Variables of Awareness and & Maturity Level of KM and Technology

Variable	Initial (1) (N=75)		Aware (2) (N=29)		Defined (3) (N=8)		Managed (4) (N=1)		Optimizing (5) (N=7)		t	r	Sig.
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.			
Feature of KMS	3.96	0.58	4.66	0.48	4.04	0.82	4.67	-	4.19	0.69	2.065	.187	.041*
Org. Structure	3.38	0.97	3.93	0.93	3.38	1.16	5.00	-	4.00	0.96	2.133	.193	.035*

** .01 Significant level (2-tailed). * .05 Significant level (2-tailed).

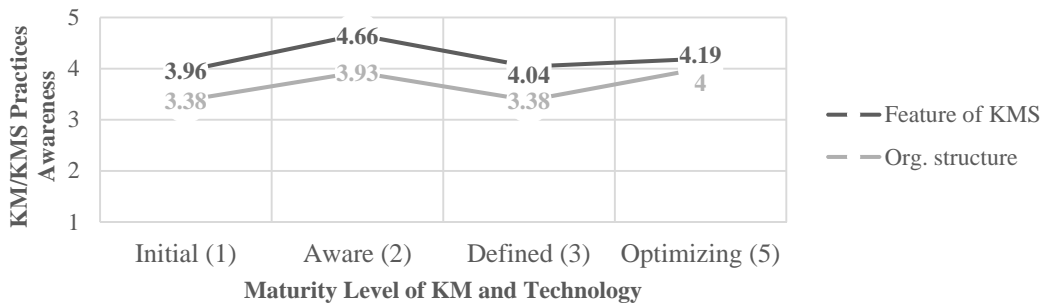


Figure 38. Means Plot of Significant Correlations between Maturity Level of KM & Technology and KM Practices Awareness

Table 26 above informs us that the awareness of Feature of KMS and Organizational structure are significantly affecting the maturity level of KM and technology. Since they have a positive correlation, the higher the awareness, the higher maturity level the companies tend to have. In Figure 38, I have hidden the Managed maturity level of KM and Technology since there is only one respondent.

5.6 KMS Preferences, Motivations, Triggers, and Barriers/Resistances

I am also absorb the KMS preferences, motivations, triggers (internal and external), and barriers & resistances questions with the multiple choice type of questions, where the respondents can answer with more than one option.

5.6.1 KMS Preferences

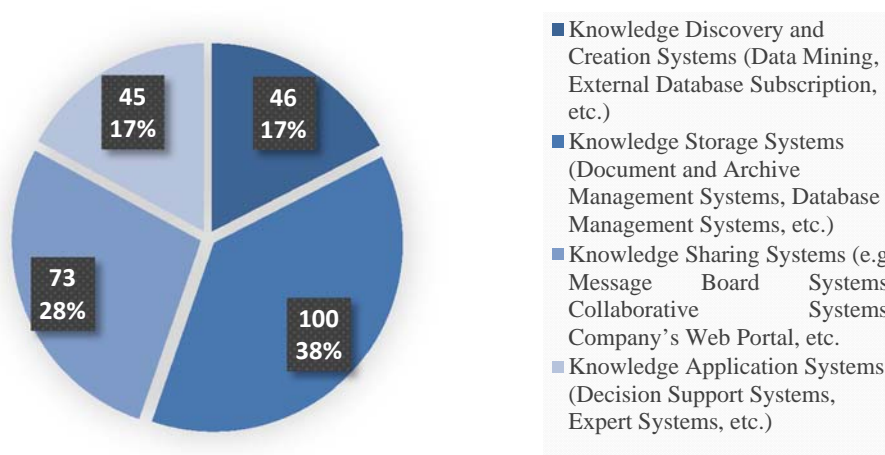


Figure 39. KMS Preferences

In Figure 39 above, we could see that most of the researched companies are prefer the KM Systems that could store the knowledge of the companies with the number of 100

or 38 %. The type of the Knowledge Storage Systems are database systems that could be used in future analysis or to help making decisions in the companies. Knowledge Sharing Systems are the second preferred type of systems with the number of 73 or 28.1 %. Knowledge Discover and Capture systems is in the third with 46 or 17.1 %. The last place is the Knowledge Application Systems with the number of 45 or 16.7 %.

According to the qualitative data of open-ended questionnaire (in Table 9, Chapter 4), there was an opinion that the SMEs are prefer to use simple program to manage their knowledge instead of complex ones. By doing so, the SMEs do not need to train their staff to use such in-house KMS. In many case studies of large enterprises, we could see that most of them are using the integrated systems in managing the corporate knowledge (Rao, 2005).

According to our follow up study result, the respondent understands that there are many available tools and KMS right now. As many of them are free and require lower investment than proprietary and in-house built systems. SMEs could adopt publicly available tools, such as Google Drive and Red Mine. However, companies should use these free services carefully since there may be security and privacy issues. Companies could develop policies and strategies regarding the use of free services where the staff could use them as the guideline. We also understand from follow up study that the respondent is aware of the privacy and security issues in free services. However, they trust the encryption provided by free services. As the companies grow, they will eventually consider in developing or acquiring systems with more advanced and sophisticated security features.

For SMEs, I proposed them to use simple open source KMS to minimize the risk of the cost and in the term of usability. There is an available open source KMS, the Open KM (Open KM, 2014). However, that system seems to be a stand-alone application that might be hard to be integrated with other existing systems. SMEs could also use the similar approach in Wang, et. al.'s research, which is integrating several open source web-based to manage the knowledge (Wang, Liu, & Wang, 2009). However, SMEs may need human resources who understand and competent with the installation and maintenance of free open source KMS. If the SMEs has enough resources to have proprietary KMS, they have to choose the vendor carefully, in the terms of support, features, ease of use, etc.

5.6.2 KM Practices Motivations

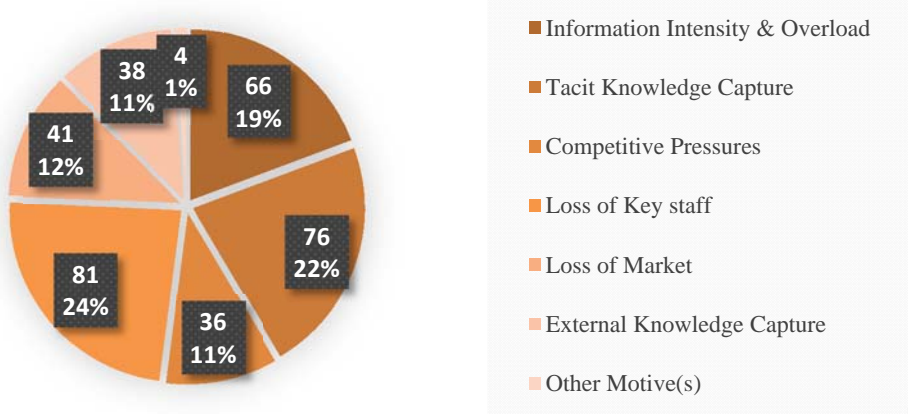


Figure 40. Motivation Implementing KM

In Figure 40, we could see the motivations of the companies to implement KM practices in their daily activities. The most motivation is the key staff lost in SMEs with 81 or 24 %, followed by difficulties to capture tacit knowledge with 76 or 22 %, Information overload with 66 or 19 %, market lost with 41 or 12%, difficulties to capture external information with 36 or 11 %, and competitive pressure with 38 or 11 %. The rest is the other motive with only 4 or 1 %. Other Motivations that have been recorded in the survey are: accountability in the big projects, quick access to the solutions, to help do the task, measurement, and analysis.

Comparison could be made with Edler’s work, where it absorbs the motivation of implementing the KM in German studies (Edler, 2003). The two most drivers for the motivation in his work is the transfer knowledge to the new workers and its integration in the real work practices. The other motives are protection of loss knowledge due to the loss of staff, used as a tool for human resource development and trainingm and to identify and capture knowledge in company.

5.6.3 KM Practices Triggers

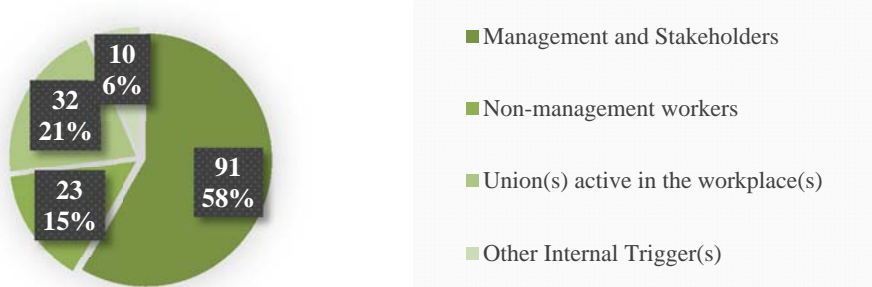


Figure 41. Internal Triggers of KM Practices

In Figure 41 we could see the internal triggers in implementing KM and KMS in the companies, where the most answer with Management that triggers the action. This means that management should support and initiate the practices of KM in the company. The Other Internal Triggers that have been recorded are: to update the knowledge and experience of staff, legal requirements, requirements for reporting activity, certification, storage and protection of information, and Easy to access the information. This result approves Adler's study in German companies that top management plays the most important aspect in KM practices (Edler, 2003). The second most important was budget and the triggers from units/departments.

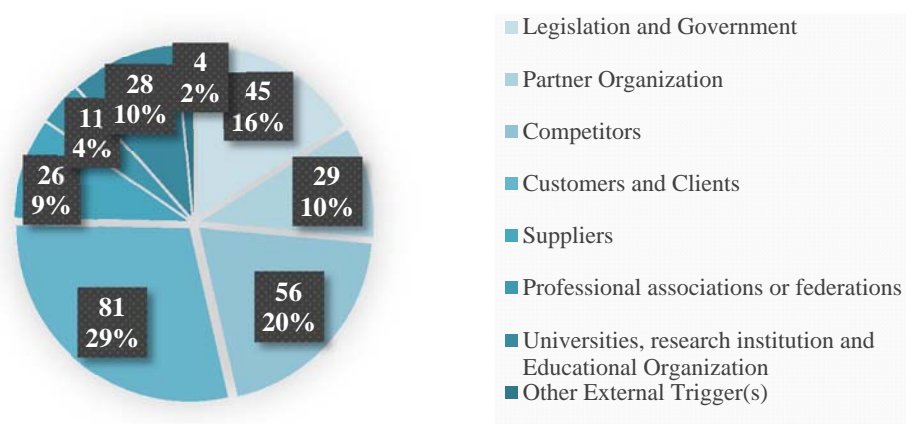


Figure 42. External Triggers of KM Practices

In Figure 42, we could see that the most external trigger is related to the customers with 81 or 29 %. The knowledge related to the customers could be related to the customers preferences, details, etc. Competitors have also important roles in the triggers with 56 or 20 % because the companies do not want to get left behind from other competitors. The number of companies that think government triggering the KM is 45 or 16 %. Therefore, government could help initiating KM in SMEs. The other external triggers are: risk reduction and external force (from grant provider, Tubitak).

According to our findings in follow up study, the triggers may depends on the activities of the companies themselves. For example, the companies who are working closely with their clients and customers, they will tend to gather more knowledge regarding their clients' interests and needs, which made the companies to increase their KM practices. Educational institutes could also publish more papers about real practices of KM in order to increase the awareness and maturity levels. Government could stimulate the KM practices by providing some regulations and laws or even providing

places to gather more companies. There are a lot of possibilities in triggering KM practices in the future.

5.6.4 KM Practices Barriers and Resistances

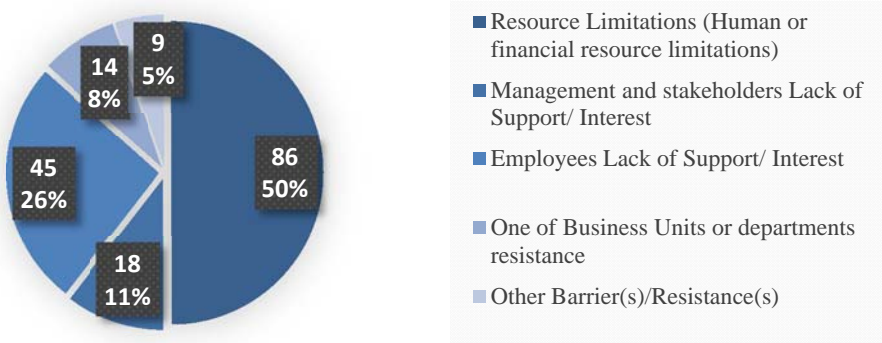


Figure 43. Barriers and Resistances of KM Practices

In Figure 43, barriers and resistances of the implementing KM and KMS are shown, where the majority is the lack of resources with 86 or 50 %. This condition is also explained in the most text book where SMEs are usually having lack of resources (human, financial, and other resources). Lack of staff support is also high with 45 or 26 %, where most of the staff do not really care of the KM and KMS. Other Barriers are: different roles or department with different interest, new experience, Lack of support from the government and other funding institutions, lack of time, and complexity of the market.

CONCLUSIONS

This study explores the KM practices in Turkish SMEs in technoparks from two different perspectives: awareness and maturity level. The measurement of awareness shows the degree of importance and expectations of the researched SMEs from different aspects of KM practices. For the measurement of awareness, I have built a comprehensive research model based on the literature review of KM best practice and critical success factors. The second measurement is evaluating the maturity level that shows the current degree of practice in the researched SMEs. I used a set of questionnaire that is based on the awareness model but it is extended to incorporate maturity inspired by the General KM Maturity Model (GKMMM). G-KMMM covers three aspects of measurement or KPAs (Key Process Areas): people, process, and technology.

This study uses Quantitative – Qualitative Sequential Explanatory Design, which prioritizes the quantitative as the primary source of data collection and analysis, followed with qualitative analysis to help explain the quantitative results.

The quantitative data collection was started with a pilot study conducted in two companies. The pilot study acted as a preliminary study to enhance clarity and to avoid ambiguity. The questionnaire was finalized based on the feedbacks of pilot study.

The next phase of the data collection was spreading the printed questionnaire in the METU technopark from October 1st – October 14th, 2013. Total 25 printed usable responses were collected. The online survey was then conducted from October 2013 – February 2014 all over technoparks in Turkey resulting in an additional 95 usable responses that gave a total of 120 usable responses.

In the analysis part, I have made inferential and descriptive statistics using SPSS and worksheet, which resulted in the graphs, figures, and tables. In the next phase, I have

performed the correlation analysis in the size, age, annual revenue, location, sector, and industry of the company towards the awareness and maturity levels of KM practices. Correlation analysis is applied with the purpose to understand any existence of associations between those aspects in the realization of the importance of KM practices and the maturity levels of KM.

Key Findings

According to the results, the awareness of KM practices of most SMEs in the study are above mid-level: three and around four on 5-level Likert scale. It means that most of them think KM practices are important to be implemented in their enterprises. In the factors of KM practices, the highest is the awareness of KMAP (KM Activities and Processes) with the average of 4.41. KMAP consists of activities related in the knowledge management, covering Knowledge Creation, Storage, Sharing, and Application. This means that the researched companies are highly aware of KM activities. The lowest factor is the awareness of KM Infrastructure with the average of 4.04 that consists of aspects that supporting the implementation of KM/KMS.

This study also look more details on the 14 variables of awareness. The highest variable is the culture (average of 4.5). The statement in culture covers the need of collaborative and innovative culture in company. It means that the participating companies are aware of the needs to develop such collaborative and innovative culture in order to make the KM succeed. Other variables that have high average are KM activities, management support, and ICT/IS. Therefore, we could deduct that the researched companies are aware of the needs of KM practices.

The variable that has the lowest average of awareness is the organizational structure (3.57) covering the statements of the need of special roles and department for managing company's knowledge. This low awareness result is supported with the organizational characteristics of SMEs: flat organizational structure with limited human resources. Hence, it is seen as a less important aspect. The other low awareness are motivational aids and HR management and training. This could be related to the lack of financial resources in most SMEs.

Our results on the awareness of the organizational culture aspect contradict with the Bozbura's study of KM practices in Turkish manufacturing companies. He found that

culture is seen as the least important factor, whereas it was the most important one in our study. On the other hand, organizational culture means different things to different people and Bozbura also found out that smaller companies may not grasp its meaning. We could also compare the results with the awareness in other countries. In Valmohammadi's study about measuring critical success factors in Iranian SMEs, Management Leadership and Support is the most important aspect (Valmohammadi, 2010). Organizational culture is the second high, which supports our findings that culture is considered to be one of the most important aspects in KM practices.

In the correlation analysis, the KM practices awareness had partial significant correlations with the size, age, annual revenue, and location of SMEs (at the level 0.05 significance level). All of the significant correlations are negative. Size, age, and annual revenue of company are having significantly negative correlation with the awareness of the culture. It means that the larger and older companies with higher annual revenue are less aware of the importance of the culture for KM. Location of company is affecting the awareness variables in Knowledge Sharing, Knowledge Application, Organizational Strategy & Finance, KM Motivational Aids, & HR Management, Training and Education. It means that the company that is located in the bigger cities are having less awareness in those aspects.

The results of correlation analysis between KM practices awareness and size approves Bozbura's study results, where the size has negative correlation with the awareness of organizational culture (Bozbura, 2007). Medium sized companies prefer to improve their existing processes and are less focused on innovation because of its potential high risks and high costs. The smaller companies, on the other hand, value innovation in a higher degree. The other comparison could be done with Jafari, et.al.'s study, where the size of company has no significant effect in the awareness of the learning factors of knowledge management in Iranian IT industry SMEs (Jafari, Fathian, Akhavan, & Hosnavi, 2007).

In the correlation analysis between KM practices awareness and Sectors, there are no significant differences. However, in the correlation between KM practices awareness and industry, only 2 out of 14 variables (Organizational Structure and KM Motivational Aids) that are significant. According to the results, the machinery industry has the lowest awareness in those two variables, while IT, Health, and

Other/Mixed industry share similar characteristics with higher awareness. Machinery industry tends to be more traditional and may be less knowledge-oriented.

Related to the awareness, it is important to note that every company has its own priority and measurement. The results may depend on the respondents knowledge, experiences, academic background, roles, resources availability, their business activities, location, etc.

On the other hand, the maturity level of the researched SMEs are low, which is around at the Initial (1) or aware (2) level (out of five maturity levels). This means that the current implementation of KM is neither well planned nor well executed. Most of KM Maturity Level measurement models, including the G-KMMM that is used in this study are having conditional requirements in each level that need to be achieved. The company will automatically fall into the level if all the requirements in a specific level have been fulfilled.

The low maturity results could be compared to Zaim's study that observes the KM practices in Izgaz, a Turkish company running in the energy industry (Zaim, 2006). Zaim's study results inform us that the KM practices in this particular Turkish company is still at infancy level and not mature. However, Salojarvi, et.al.'s study on the high maturity levels of KM practices of SMEs in Finland shows the difference between the two countries (Salojarvi, Furu, & Sveiby, 2005).

In the next phase, I have done the correlation analysis between three KPAs of KM maturity level and size, age, annual revenue, and location of the company. From 12 correlations, seven are found to be significantly correlated. All of the correlations are all positive, contrary to the awareness where most of them are negative. The positive correlations mean that the larger or older companies tend to have higher maturity levels. Similarly, companies with higher annual revenues or located in the bigger cities tend to have a higher KM maturity level. The results are not surprising since such companies are more established and have more resources to implement KM. More resources means that they are more flexible in KM practices.

According to the results, there are no significant differences of KM Maturity Level in all KPAs related to the sector and industry (at the significance level of 0.05). I can conclude that the KM Maturity Level is not depend on the type of sector or industry of the company.

I also did the correlation analysis between the awareness and the maturity level of KM. In the correlation analysis of the variables of awareness and the maturity level of KM, 10 out of 42 correlations are positively significant. We could conclude that the higher awareness means that the companies are tend to have higher maturity level of KM. This is logically accepted, since whenever the companies think that they are important, they will try to implement for their greater good.

According to our surveys, most of researched SMEs preferred mainly using Knowledge Storage Systems for KMS, where the company could store and manage their knowledge effectively. The follow up study explains that the SMEs prefer simple systems to avoid the costs of training and development. The major motivation of implementing the KM practices was the fear of losing the key staff in SMEs. As most SMEs have small number of trained and highly competent staff, managing those key staff's knowledge for further use is paramount. Similarly, SMEs are highly motivated in practicing the KM to capture tacit knowledge. Similar outcomes are reported in Edler's study on the motivation of KM practices in German SMEs where most of them are implementing the KM practices against potential knowledge loss due to loss of key staff (Edler, 2003).

For the triggers of practicing the KM, most of SMEs think that it should come from inside of the company, which is the management support. Therefore, whenever the managers are highly aware of KM, the implementation of KM would also be increased. In Edler's study of KM practices in German SMEs, management support is also seen as the most important trigger. The external triggers are coming mostly from the customers, competitors, and government. The external triggers depend on the business processes the companies are doing. The customers could be a good external trigger for KM practices since most companies are trying to understand the need of their customers. The competitors could triggers the KM practices to become competitive. The government could also triggers the KM practices through the regulations and laws.

I also capture the barriers and resistance of KM practices in the researched SMEs. As have been expected previously and related to the characteristics of SMEs, most of the barriers in the researched SMEs are the limitation of the resources. It plays the most important role in the drawback of the implementation of KM. There are also lacks of support from the staff to make the implementation of KM become successful.

Based on the results, we could draw conclusions that most of the researched SMEs are aware of the importance of KM practices. However, most of them are having low maturity level. The low maturity level also means that the current practice is in a casual manner, without any guidance, and not taken seriously. Most of the results are related to the characteristics of the SMEs, such as lack of resources, flatter structure of organization, etc. Therefore, we should consider those characteristics of KM practices in SMEs.

Limitations and Further Research

This study focusing only on the capturing the KM practices in Turkish SMEs in technoparks, where most of the companies are running in the technological industries. In our One Way ANOVA results, there are very little significance of sectors and industry in the KM practices awareness and KM Maturity Level. According to Young's book, where we could learn the real KM practices that have been applied by various kinds of enterprises, we could infer that KM can be applied to any kind of sector (Young T. , 2008). However, the further study on other areas could make the literatures become richer. It would be more interesting to investigate other SMEs in other areas, such as family businesses, street retailers, etc.

Further studies could also be done in other developing countries, where the comparison could possibly made. Studies on how large companies behaviors on KM practices are also important for the comparison with the SMEs.

The study that observe organizations that have been practicing high maturity level of KM could also give insights to many managers that could be used as the best practice for other companies. There should be a study related to the roles of every party in triggering the KM practices. It could be used as the strategy to increase the maturity level of KM.

REFERENCES

- Abramowicz, W., Kowalkiewicz, M., & Zawadzki, P. (2003). Ontology Frames for IT Courseware Representation. In *Knowledge Management: Current Issues and Challenges* (pp. 1-11). Hershey: IRM Press.
- Adler, P. (2001). Market, Hierarchy, and Trust: The Knowledge Economy and the Future of Capitalism. *Organizational Science*, 12(2), 215-234.
- Akhavan, P., Jafari, M., & Fathian, M. (2006). Critical success factors of knowledge management systems: a multi-case analysis. *European Business Review*, 18(2), 97-113.
- Alavi, M., & Leidner, D. E. (1999). Knowledge Management Systems: Issues, Challenges, and Benefits. *Communications of AIS*, 1(7), 1-37.
- Alavi, M., & Leidner, D. E. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *MIS Quarterly*, 25(1), 107-135.
- Antonius, R. (2003). *Interpreting quantitative data with SPSS*. London: Sage.
- Arain, F. M., & Pheng, L. S. (2006). A Knowledge-Based System as a Decision Making Tool for Effective Management of Variations and Design Improvement: Leveraging on Information Technology Applications. *ITcon*, 11, 373-392.
- Ashton, D., & Green, F. (1996). *Education, Training and the Global Economy*. Cheltenham: Edward Elgar.
- Babbie, E. (1990). *Survey research methods, 2nd ed.* Belmont: Wadsworth Pub. Co.

- Badan Pusat Statistik. (2008, May 30). *Perkembangan Indikator Makro UKM Tahun 2008*. Retrieved from <http://www.scribd.com/doc/16888581/Berita-Resmi-Statistik-Ukm-Bps-2008>
- Bailey, C. A. (2007). *A Guide to Qualitative Field Research: Second Ed.* Thousands Oaks: Pine Forge Press.
- Becerra-Fernandez, I., González, A. J., & Sabherwal, R. (2004). *Knowledge Management: Challenges, Solutions, and Technologies*. Upper Saddle River: Prentice hall.
- Boahene, M., & Ditssa, G. (2003). Conceptua Confusions in Knowledge Management and Knowledge Management Systems: Clarifications for Better KMS Development. In *Knowledge Management: Current Issues and Challenges* (pp. 12-24). Hersheys: IRM Press.
- Bozbura, F. T. (2007). Knowledge Management Practices in Turkish SMEs. *Journal of Enterprise Information* , 20(2), 209-221.
- Business Dictionary. (2014, May 12). *Null Hypothesis*. Retrieved from BusinessDictionary.com: <http://www.businessdictionary.com/definition/null-hypothesis.html>
- Carmel, D. (2009). Effective Knowledge Management for Professional Services. In M. (. Rao, *Knowledge Management Tools and Techniques: Practitioners and Experts Evaluate KM Solutions* (pp. 384-392). Amsterdam: Elsevier.
- Carneiro, A. (2000). How does knowledge management influence innovation and competitiveness? *Journal of Knowledge Management*, 4(2), 87-98.
- Chang, T.-C., & Chuang, S.-H. (2009). Performance Effects of Knowledge Management: Corporate Management Characteristics and Competitive Strategy Enablers. *Asian Journal of management and Humanity Sciences*, 4(4), 181-199.
- Chaudhry, A. S. (2003). What Difference Does It Make: Measuring Returns of Knowledge Management. In *Knowledge Managemen: Current Issues and Challenges* (pp. 52-65). Hershey: IRM Press.

- Chaudhry, A. S. (2004). Enterprise Portals and Knowledge Management Processes. In B. Montano, *Innovations of Knowledge Management* (pp. 175-199). Hershey: IRM Press.
- Chen, S., Duan, Y., Edwards, J. S., & Lehaney, B. (2006). Toward Understanding Inter-Organizational Knowledge Transfer Needs in SMES: Insight from a UK Investigation. *Journal of Knowledge Management*, 10(3), 6-23.
- Coakes, E. (. (2003). *Knowledge Management: Current Issues and Challenges*. Hershey: IRM Press.
- Crano, W. D., & Brewer, M. B. (2001). *Principles and Methods of Social Research, 2nd ed.* Mahway: Lawrence Erlbaum Associates.
- Davenport, T. H., & Prusak, L. (1998). *Working Knowledge: How Organizations Manage What They Know*. Boston: Harvard Business School Press.
- Desouza, K. C., & Awazu, Y. (2006). Knowledge Management at SMEs: Five Peculiarities. *Journal of Knowledge Management*, 10(1), 32-43.
- Duffy, J. (2000). Knowledge Management: What Every Information Professional Should Know. *The Information Management Journal*(July), 10-16.
- Edler, J. (2003). *Knowledge Management in German Industry: German Study in the Framework of the OECD Study*. Karlsruhe: Federal Ministry for Education and Research (BMBF).
- Ericsson, F., & Avdic, A. (2003). Knowledge Management Systems Acceptance. In *Knowledge Managemen: Current Issues and Challenges* (pp. 39-51). Hershey: IRM Press.
- Fan, Q. (2003). Importance of SMEs and the Role of Public Support in Promoting SME Development. *Creating A Conducive Legal & Regulatory Framework for Small and Medium Enterprise Development in Russia*, (pp. 1-27). Retrieved from World Bank.
- Geisler, E. (2007). A Typology of Knowledge Management: Strategic Groups and Role Behavior in Organizations. *Journal of Knowledge Management*, 11(1), 84-96.

- Ghobadian, A., & Gallear, D. (1997). TQM and organization size. *International Journal of Operations*, 17(2), 121-163.
- Goodson, B. (2005). Ready for Take-off: Knowledge Management Infrastructure at EasyJet. In M. (. Rao, *Knowledge Management Tools and Techniques: Practitioners and Experts Evaluate KM Solutions* (pp. 147-165). Amsterdam: Elsevier.
- Haldin-Herrgard, T. (2000). Difficulties in Diffusion of Tacit Knowledge in Organizations. *Journal of Intellectual Capital*, I(4), 357-365.
- Herschel, R. T., Nemati, H., & Steiger, D. (2001). Tacit to Explicit Knowledge Conversion: Knowledge Exchange Protocols. *Journal of Knowledge Management*, 5(1), 107-116.
- Hesse-Biber, S. N. (2010). *Mixed methods research : merging theory with practice*. New York: Guilford Press.
- Hussein, A. A., & Wahba, K. (2003). The Readiness of IDSC to Adopt Knowledge Management. In E. Coakes, *Knowledge Management: Current Issues and Challenges* (pp. 239-262). Hershey: IRM Press.
- Info UKM. (2008, August 11). *Keragaman Definisi UKM di Indonesia*. Retrieved from Info UKM: <http://infoukm.wordpress.com/2008/08/11/keragaman-definisi-ukm-di-indonesia/>
- Jafari, M., Fathian, M., Akhavan, P., & Hosnavi, R. (2007). Exploring KM Features and Learning in Iranian SMEs. *VINE: The Journal of Information and Knowledge Management Systems*, 37(2), 207-218.
- Jennex, M. E. (2003). A Survey of Internet Support for Knowledge Management/Organizational Memory Systems. In *Knowledge Management: Current Issues and Challenges* (pp. 132-146). Hershey: IRM Press.
- Jewels, T., & Underwood, A. (2004). The Impact of Informal Networks on Knowledge Management Strategy. In B. Montano, *Innovations of Knowledge Management* (pp. 1-21). Hershey: IRM Press.
- Joshi, K., & Sarker, S. (2003). A Framework to Study Knowledge Transfer During Information Systems Development (ISD) Process. In *Knowledge*

- Management: Current Issues and Challenges* (pp. 25-38). Hershey: IRM Press.
- Joslin, R. (2007). The Knowledge Management Maturity Model. *CRM Magazine*, 11(11), 8-8.
- Kalim, R., & Lodhi, S. A. (2002). The Knowledge-Based Economy: Trends and Implications for Pakistan. *The Pakistan Development Review*, 41(4), 787-804. Retrieved from <http://ideas.repec.org/a/pid/journal/v41y2002i4p787-804.html>
- Koh, S. C., & Maguire, S. (2004). Identifying the Adoption of E-Business and Knowledge Management within SMES. *Journal of Small Business and Enterprise Development*, 11(3), 338-348.
- Laudon, K. C., & Laudon, J. P. (2012). *Management Information Systems: Managing the Digital Firm*. Upper Saddle River: Prentice Hall.
- Laupase, R. (2003). Rewards: Do They Encourage Tacit Knowledge Sharing in Management Consulting Firms? Case Studies Approach. In *Knowledge Management: Current Issues and Challenges* (pp. 92-103). Hershey: IRM Press.
- Leung, A. C. (2004). Making Knowledge Management System an Effective Tool for Learning and Training. In B. Montano, *Innovations of Knowledge Management* (pp. 124-148). Hershey: IRM Press.
- Liebowitz, J. (1999). Key ingredients to the success of an organization's knowledge management strategy. *Knowledge and Process Management*, 6(1), 37-40.
- Maguire, S., Koh, S. C., & Magryst, A. (2007). The Adoption of E-Business and Knowledge Management in SMEs. *Benchmarking: An International Journal*, 14(1), 37-58.
- Matthews, B., & Ross, L. (2010). *Research methods : a practical guide for the social sciences* . New York: Pearson Longman.
- McAdam, R., & Reid, R. (2001). SME and Large Organization Perceptions of Knowledge Management: Comparisons and Contrasts. *Journal of Knowledge Management*, 5(3), 231-241.

- McManus, D. J., & Snyder, C. A. (2003). Knowledge Management: The Missing Element in Business Continuity Planning. In *Knowledge Management: Current Issues and Challenges* (pp. 79-91). Hershey: IRM Press.
- Mitchell, H. J. (2003). Technology and Knowledge Management: Is Technology Just an Enabler or Does It also Add Value? In *Knowledge Management: Current Issues and Challenges* (pp. 66-78). Hershey: IRM Press.
- Muhasebe Rehberi. (2014, April 30). *Teknoloji Geliştirme Bölgeleri Mevzuatları* . Retrieved from Teknoloji Geliştirme Bölgeleri Mevzuatları : <http://www.muhasabenet.net/teknokent%20mevzuati.html>
- Nada, N., Ghanem, M., & Mesbah, S. (2012). Innovation and Knowledge Management Practice in Turkish SMEs. *Journal of Knowledge Management, Economics and Information Technology*, II(1), 248-265.
- NCTI: National Center for Technology Innovation. (n.d.). *Case Study*. (NCTI) Retrieved June 1, 2012, from <http://www.nationaltechcenter.org/index.php/products/at-research-matters/case-study/>
- Nonaka, I. (2008). *The Knowledge Creating Company*. Boston: Harvard Business Press.
- Nonaka, I., & Hirotaka, T. (1995). *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*. New York: Oxford University Press.
- Nonaka, I., Toyama, R., & Hirata, T. (2008). *Managing Flow: A Process Theory of the Knowledge-Based Firm*. Hampshire: Palgrave Macmillan.
- Nunes, M. B., Annansingh, F., Eaglestone, B., & Wakefield, R. (2002). Knowledge Management Issues in Knowledge-Intensive Smes. *Journal of Documentation*, 62(1), 101-119.
- OECD. (2008). *Enhancing the Role of SMEs in Global Value*. OECD Publishing.
- OECD. (2010). *SMEs, Entrepreneurship and Innovation*. OECD.

- Ogiwara, N., Young, R., Talisayon, S., & Bunyagidj, B. (2010). *Practical Knowledge Management Guide for SME Owners and Managers*. Tokyo: Asian Productivity Organization.
- Open KM. (2014, May 26). *OpenKM Community*. Retrieved from Open KM: <http://www.openkm.com/en/community.html>
- Oxford. (2004). Oxford Dictionary.
- Park, Y., & Choi, D. Y. (2005). The Shortcomings of a Standardized Global Knowledge Management Systems: The Case Study of Accenture. *Academy of Management Executive, 19*(2), 81-85.
- Park, Y., Kim, Y., & Kang, I. (2003). On the Design of Knowledge Management System for R & D Organization: Integration of Process of Management and Content Management. In *Knowledge Management: Current Issues and Challenges* (pp. 147-154). Hershey: IRM Press.
- Pearlson, K. E., & Saunders, C. S. (2006). *Managing & Using Information Systems: A Strategic Approach*. New Caledonia: Wiley.
- Pee, L. G., & Kankanhalli, A. (2009). A Model of Organisational Knowledge Management Maturity Based on People, Process, and Technology. *Journal of Information & Knowledge Management, 8*(2), 79-99.
- Probst, G. J. (1998). Practical Knowledge Management: A Model That Works. *Prism, 17*-29.
- Quinlan, C. (2011). *Business Research Methods*. Hampshire: South-Western. Cengage Learning.
- Rao, M. (. (2005). *Knowledge Management Tools and Techniques: Practitioners and Experts Evaluate KM Solutions*. Amsterdam: Elsevier.
- Rasheed, N. (2005). The Impact of Knowledge Management on SME'S. *Knowledge Board, 1*-15. Retrieved March 11, 2013, from <http://www.knowledgeboard.com/download/2539/THE-IMPACT-OF-KM-ON-SMEs.pdf>
- Rea, L. M., & Parker, R. A. (2005). *Designing & Conducting Survey Research: A Comprehensive Guide, 3rd ed*. Hoboken: Jossey-Bass.

- Revilla, E., Rodri'guez-Prado, B., & Prieto, I. (2009). Information Technology as Knowledge Management Enabler in Product Development: Empirical Evidence. *European Journal of Innovation Management*, 12(3), 346-363.
- Rhem, A. J. (2005). *UML for Deveoping Knowledge Management Systems*. Boca Raton: Auerbach Publications.
- Roberts, J. (2000). From Know-how to Show-how? Questioning the Role of Information and Communication Technologies in Knowledge Transfer. *Technology Analysis & Strategic Management*, 12(4), 429-443. Retrieved from <http://dx.doi.org/10.1080/713698499>
- Salojarvi, S., Furu, P., & Sveiby, K.-E. (2005). Knowledge Management and Growth in Finnish SMEs. *Journal of Knowledge Management*, 9(2), 103-122.
- Silverman, B. G. (1995). Knowledge-Based Systems and Decision Sciences. *Interfaces*, 67-82.
- Susman, G. I. (2007). *Small and Medium-Sized Enterprises and the Global Economy*. Massachusetts: Edward Elgar Publishing.
- Tseng, S.-M. (2008). The Effects of Information Technology on Knowledge Management Systems. *Expert Systems with Applications*(35), 150-160.
- Turban, E., Sharda, R., & Delen, D. (2011). *Decision support and business intelligence systems*. Boston: Prentice Hall.
- University of Oregon. (2014, May 4). *Regression and correlation analysis*. Retrieved from University of Oregon: <http://abyss.uoregon.edu/~js/glossary/correlation.html>
- Valmohammadi, C. (2010). Identification and Prioritization of Critical Success Factors of Knowledge Management in Iranian SMES: An Experts' View. *African Journal of Business Management*, 4(6), 915-924.
- Van Gils, A., & Zwart, P. (2004). Knowledge Acquisition and Learning in Dutch and Belgian SMEs: The Role of Strategic Alliances. *European Management Journal*, 22(6), 685-692.

- Wang, R. (2003). The Value of Trust in Knowledge Sharing. In *Knowledge Management: Current Issues and Challenges* (pp. 116-130). Hershey: IRM Press.
- Wang, X., Liu, R., & Wang, W. (2009). Knowledge Management System Based on Knowledge Flow in Web2.0 Environment. *IEEE International Symposium on IT in Medicine & Education*, 372-377.
- Warsh, D. (2006). *Knowledge and the Wealth of Nations: A Story of Economic Discovery*. New York: W.W. Norton & Company.
- WebRazzi. (2012, Februari 27). *Girişimcilere Teknokent yasası hakkında pratik bilgiler*. Retrieved from Girişimcilere Teknokent yasası hakkında pratik bilgiler: <http://www.webrazzi.com/2012/02/27/girisimcilere-teknokent-yasasi-hakinda-pratik-bilgiler/>
- Wiig, K. M. (1997). Knowledge Management: An Introduction and Perspective. *The Journal of Knowledge Management*, 1(1), 6-14.
- Wong, K. Y. (2005). Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises. *Industrial Management & Data Systems*, 105(3), 261-279.
- Wong, K. Y., & Aspinwall, E. (2004). Characterizing Knowledge Management in The Small Business Environment. *Journal of Knowledge Management*, 8(3), 44-61.
- Wood, S., & Reynolds, J. (2012). Managing communities and managing knowledge: strategic decision making and store network investment within retail multinationals. *Journal of Economic Geography*(12), 539-565.
- Wright, G., & Taylor, A. (2003). Strategic Knowledge Sharing for Improved Public Service Delivery: Managing an Innovative Culture for Effective Partnership. In E. Coakes, *Knowledge Management: Current Issues and Challenges* (pp. 187-211). Hershey: IRM Press.
- Young, D. (2010). *Knowledge Management Tools and Techniques manual*. Hirakawacho: Asian Productivity Organization.
- Young, T. (2008). *Knowledge Management for Services, Operations and Manufacturing*. Oxford: Chandos Publishing.

Zaim, H. (2006). Knowledge Management Implementation in IZGAZ. *Journal of Economic and Social Research*, 8(2), 1-25.

Zanjani, M. S., Mehrasa, S., & Modiri, M. (2009). Organizational Dimensions as Determinant Factors of KM Approaches in SMEs. *International Journal of Human and Social Sciences*, 4(8), 590-595.

APPENDICES

APPENDIX A: CORRELATIONS MATRIX BETWEEN SIZE, AGE, ANNUAL REVENUE, AND LOCATION OF COMPANY

Table 27. Correlation Matrix between Size, Age, Annual revenue, and Location of Company

	Size of Company		Age of Company		Annual revenue		Location	
	r	Sig.	r	Sig.	r	Sig.	r	Sig.
Size of Company	1		.572	.000**	.803	.000**	.279	.002**
Age of Company	.572	.000**	1		.497	.000**	.006	.950 ns
Annual revenue	.803	.000**	.501	.000**	1		.249	.006**
Location	.279	.002**	.006	.950 ns	.249	.006**	1	

NS. Not significant. **. 0.01 Significant level (2-tailed). *. 0.05 Significant level (2-tailed).

Table 27 shows us that most of the aspects are having positive significant correlations. There is only one insignificant correlation between age and location of the company, which means that the location of the old and young companies are spread across small and big cities.

APPENDIX B: QUESTIONNAIRE CONSTRUCT MODEL

Table 28. Construct Model of Organizational Performance measurement Factor

Organizational Performance Measurement		
Construct Model	Statement/Questions Items	Statement/Questions Items (Turkish Translation)
Effects on Organizational Performance	<p>1. Well-managed knowledge and its practices should be recognized as the way of enhancing the innovativeness of our firm.</p> <p>2. Well-managed knowledge and its practices should be recognized as a way for earning long-term growth in our firm.</p> <p>3. Well-managed knowledge and its practices should be recognized as the way of enhancing the competitive advantage of our firm.</p>	<p>1. OPerfM_EffectOP1 - 11. BYS uygulamaları sayesinde iyi yönetilen bilgi şirketimizin yenilikçiliğini geliştirmesini sağlar.</p> <p>2. OPerfM_EffectOP2 - 12. BYS uygulamaları sayesinde iyi yönetilen bilgi şirketimize uzun vadeli büyüme sağlar.</p> <p>3. OPerfM_EffectOP3 - 13. BYS uygulamaları sayesinde iyi yönetilen bilgi şirketimizin rekabet avantajını geliştirir.</p>
Measurement Tools	<p>1. Our firm needs to create an evaluation & measurement standard model to evaluate the effectiveness of the KM/KMS.</p> <p>2. Our firm will always try to improve the KM System based on the previous evaluation.</p>	<p>1. OPerfM_Measure1 - 9. Şirketimizde uluslararası standartlara uygun olarak hazırlanacak bir BY/BYS etkililiği değerlendirme modeli oluşturmaktadır.</p> <p>2. OPerfM_Measure2 - 10. Şirketimiz daima önceki değerlendirmelere göre BY sistemini geliştirmek için çalışmaktadır.</p>
		<p>Sources and Support Details to Construct Model and Items (Chaudhry, What Difference Does It Make: Measuring Returns of Knowledge Management, 2003) (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005) (Carneiro, 2000) (Coakes, 2003) (Turban, Sharda, & Delen, 2011) (Chang & Chuang, 2009) (Probst, 1998) (Pee & Kankanhalli, 2009) (Becerra-Fernandez, Gonz�lez, & Sabherwal, 2004)</p>

Table 29. Construct Model of KM Activities and Processes Factor

KM activities and Processes			
Construct Model	Statement/Questions Items	Sources and Support Details to Construct Model and Items	Statement/Questions Items (Turkish Translation)
Knowledge Creation (Socialization, Externalization, & Combination, & Internalization.)	<ol style="list-style-type: none"> 1. My firm should be able to innovate within the enterprise (R&D, marketing, production etc.) 2. My firm should be able to absorb innovation and novelty from outside the enterprise. 3. The staff in our firm should make reports and documentation regarding their jobs. 	<p>(Edler, 2003) (Becerra-Fernandez, González, & Sabherwal, 2004) (Nonaka, Toyama, & Hirata, Managing Flow: A Process Theory of the Knowledge-Based Firm, 2008) (Nonaka, The Knowledge Creating Company, 2008) (Nonaka & Hiroataka, The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation, 1995) (Herschel, Nemati, & Steiger, 2001) (Davenport & Prusak, 1998) (Alavi & Leidner, Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues, 2001) (Joshi & Sarker, 2003)</p>	<ol style="list-style-type: none"> 1. KMAP_KCreate1 - 1. Şirketimiz iş süreçlerinde sürekli yenilik yapmalıdır. 2. KMAP_KCreate2 - 2. Şirketimiz kurum dışındaki yenilikleri benimsemelidir. 3. KMAP_KCreate3 - 3. Şirketimizde çalışanlar işleri ile ilgili rapor ve dokümantasyon hazırlamalıdır.
Knowledge Storage	<ol style="list-style-type: none"> 1. Our firm should have a well-designed central place to store documents and organizational knowledge that every staff can use it. 2. In our firm, documents and reports related to the firm should be organized clearly and retrievable. 		<ol style="list-style-type: none"> 1. KMAP_KStorage1 - 22. Şirketimizde kurumsal bilgi ve dokümanların tutulduğu, çalışanların kolaylıkla erişebileceği bilgi merkezi/arsiv olmalıdır. 2. KMAP_KStorage2 - 4. Şirketimizde, belge ve raporlar erişilebilir şekilde düzenlenmelidir.
Knowledge Sharing	<ol style="list-style-type: none"> 1. Meetings and discussion are necessary in our firm to discuss new ideas and results and to share individual knowledge related to work. 2. In our firm, there should be collaboration based on all competency of the staff. 3. Our firm should use formal networks/media for information exchange with stakeholders and partners. 		<ol style="list-style-type: none"> 1. KMAP_KSharing1 - 21. Şirketimizde yeni fikirleri ve sonuçları tartışmak ve işle ilgili bireysel bilgi paylaşımı için toplantılar olmalıdır. 2. KMAP_KSharing2 - 5. Şirketimizde, personelin ilgi alanlarına ve yetkinliklerine dayalı işbirliği olmalıdır. 3. KMAP_KSharing3 - 6. Şirketimiz paydaşlarıyla bilgi paylaşımı için formal ağları ve medyaları kullanılmalıdır.
Knowledge Application	<ol style="list-style-type: none"> 1. Our firm shall use the previous experiences and knowledge to tackle any problems in the firm. 2. Our firm shall use previous experiences as the base for decision-making process. 		<ol style="list-style-type: none"> 1. KMAP_KApp1 - 7. Şirketimiz bir sorunu çözmek için önceki bilgi ve tecrübeleri kullanmalıdır. 2. KMAP_KApp2 - 8. Şirketimiz karar verme sürecinde temel olarak önceki deneyimlerini kullanmalıdır.

Table 30. Construct Model of KMS (ICT and IS aspects of KM) Factor

KMS (ICT and IS aspects of KM)		
Construct Model	Statement/Questions Items	Statement/Questions Items (Turkish Translation)
Type of KMS	<p>Types of KMS:</p> <ul style="list-style-type: none"> Knowledge Discovery and Creation Systems (Data Mining, External Database Subscription, etc.) Knowledge Storage Systems (Document and Archive Management Systems, Database Management Systems, etc.) Knowledge Sharing Systems (e.g. Message Board Systems, Collaborative Systems, Company's Web Portal, etc.) Knowledge Application Systems (Decision Support Systems, Expert Systems, etc.) 	<p>Sources and Support Details to Construct Model and Items</p> <p>(Turban, Sharda, & Delen, 2011) (Becerra-Fernandez, González, & Sabherwal, 2004) (Laudon & Laudon, 2012)</p> <ul style="list-style-type: none"> KMS_Preference-Bilgi Arama ve Yakalama Sistemleri (Veri madenciliği, Dış veri tabanlarına &uuml;yelik, vb.) KMS_Preference-Bilgi Depolama Sistemleri (Dok&uuml;man ve Arşiv Y&ouml;netim Sistemleri, Veri tabanı sistemleri, Karar Destek Sistemleri, vb.) KMS_Preference-Bilgi Paylaşımı Sistemleri (Mesajlaşma sistemleri, İşbirliği sistemleri, Firma portali vb.) KMS_Preference-Bilgi Uygulama Sistemleri (Karar Destek Sistemleri, Uzman sistemler, vb.)
Feature and Technical Details.	<ol style="list-style-type: none"> Our firm needs the ICT-based KM Systems which is built upon the needs and expectations of the staff in managing knowledge. The ICT-based KM Systems should support all staff and be integrated with all business units and business process in our firm. In our firm, the ICT-based KM Systems should support ONLY to specific managers and/or department and NOT for all staff. (Crosscheck Statement) Our firm shall provide the ICT infrastructure to support the KM activities. 	<ol style="list-style-type: none"> KMS_FeatureTech1 - 23. Şirketimizde personelin bilgi yönetimindeki ihtiyaçlarını ve beklentilerini karşılamak üzere BIT tabanlı bir BY sistemlerine ihtiyaç vardır. KMS_FeatureTech2 - 27. BIT/BS-tabanlı BYS tüm iş personeli desteklemeli ve firmamızdaki tüm iş birimleri ve süreçleriyle entegre olmalıdır. KMS_FeatureTech3_Uninverted - 28. BIT/BS-tabanlı BYS yalnızca üst yöneticileri ve özel bir bölümü desteklemelidir. KMS_FeatureTech4 - 24. Şirketimiz BY faaliyetlerini desteklemek için gerekli olan BT altyapısını sağlamalıdır.
Benefits	<ol style="list-style-type: none"> ICT/IS-based KM enable rapid and faster search, access, and retrieval of information and knowledge in our firm. The ICT-based KM could increase significant level of effectiveness and efficiency in our firm now and in the future. 	<ol style="list-style-type: none"> KMS_Benefits1 - 25. Şirketimizde BIT/BS-tabanlı bilgi yönetimi sistemleri hızlı arama ve bilgiye daha hızlı erişme için bir araç olarak görülmelidir. KMS_Benefits2 - 26. BIT/BS-tabanlı BYS şimdi ve gelecekte şirketimizin etkinliğini ve verimliliğini

Table 30. Construct Model of KMS (ICT and IS aspects of KM) Factor (Continued)

			In Small And Medium Enterprises, 2005) (Park, Kim, & Kang, 2003) (Jennex, 2003) (Boahene & Ditssa, 2003) (Laudon & Laudon, 2012) (Koh & Maguire, 2004)	önemli düzeyde artırmak için bir araç olarak görülmelidir.
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Table 31. Construct Model of KM Infrastructure Factor

KM Infrastructure				
Construct Model	Statement/Questions Items	Sources and Support Details to Construct Model and Items	Statement/Questions Items (Turkish Translation)	
Management leadership and support	<ol style="list-style-type: none"> 1. The upper management level needs to encourage the staff to make the KMS successful in our firm. 2. The upper management should initiate, support, and commit to the implementation of KMS in our firm. 	(Davenport & Prusak, 1998) (Duffy, 2000) (Becerra-Fernandez, González, & Sabherwal, 2004) (Probst, 1998) (Wong, Critical Success Factors For Implementing Knowledge Management In Small And Medium Enterprises, 2005) (Wang R., 2003) (Liebowitz, 1999) (Coakes, 2003) (Laupase, 2003)	<ol style="list-style-type: none"> 1. KMInfraStrctr_MgmtLeadrsHpSupp1 - 14. Şirketimizde BY/BYS'nin başarılı olması için üst kademe yöneticilerin personeli teşvik etmesi gereklidir. 2. KMInfraStrctr_MgmtLeadrsHpSupp2 - 15. Üst kademe yönetim şirketimizde BY/BYS'nin uygulanmasını başlatıp, desteklemelidir. 	
Culture (Learning and Innovative Culture)	<ol style="list-style-type: none"> 1. Our firm needs to develop trust, innovative and collaborative culture for growth and creating novelty products and services. 2. Our firm should frequently explores new operational and product development processes. 		<ol style="list-style-type: none"> 1. KMInfraStrctr_Culture1 - 16. Şirketimiz büyümek ve yeni ürün veya hizmetler sunmak için yenilikçi, güven ve işbirliğine dayalı kültür geliştirmelidir. 2. KMInfraStrctr_Culture2 - 17. Şirketimiz sık sık yeni hizmet ve ürün geliştirme olanaklarını araştırmalıdır. 	
Strategy and financial support	<ol style="list-style-type: none"> 1. Our firm needs clear, well-defined strategy and purpose in implementing the KMS. 2. KM practices, innovation, collaboration should be incorporated with firm's strategy and vision. 3. Our firm shall allocate a sufficient financial budget for the implementation of KMS. 		<ol style="list-style-type: none"> 1. KMInfraStrctr_StrategyFinance1 - 29. Şirketimiz BY/BYS'nin uygulanmasında açık, iyi tanımlanmış stratejiye ve amaçlara ihtiyaç duyar. 2. KMInfraStrctr_StrategyFinance2 - 18. BY uygulamaları şirketimizin strateji ve vizyonuna dahil edilmelidir. 3. KMInfraStrctr_StrategyFinance3 - 19. Şirketimiz BY/BYS'nin uygulanması için yeterli mali bütçe tahsis etmelidir. 	

Table 31. Construct Model of KM Infrastructure Factor (Continued)

<p>Organizational structure</p>	<p>1. Our firm needs a specific role of staff that manage our firm knowledge (e.g. Chief Knowledge Officer). 2. Our firm needs a specific department that managing knowledge (e.g. Research and Development, KM department, IT department).</p>	<p>1. KMInfraStrctr_OrgInfras1 - 30. Şirketimizde başlıca görevi bilgiyi yönetmek olan bir personel mevcuttur veya böyle bir personele ihtiyaç vardır (CIO, CKO, BT Müdürü gibi). 2. KMInfraStrctr_OrgInfras2 - 31. Şirketimiz başlıca işi bilgiyi yönetmek olan bir birime ihtiyaç duyar (Bilgi Teknolojileri gibi).</p>
<p>Motivational aids</p>	<p>1. Our firm needs monetary and non-monetary incentives to motivate so that the staff encouraged using KMS. (e.g. Promotion). 2. In our firm, incentive systems should focus on criteria such as knowledge sharing and participation, collaboration, creative thinking, and innovative solutions.</p>	<p>1. KMInfraStrctr_MotiveAids1 - 32. Şirketimiz BY'nin uygulanmasını ve BYS kullanımını motive etmek için çalışanlarına teşvikler vermektedir (tatil, maddi destek gibi). 2. KMInfraStrctr_MotiveAids2 - 33. Şirketimizde teşvik, bilgi paylaşımı ve katkı, takım çalışması, yaratıcılık ve yenilikçi çözümler gibi kriterlere odaklı olmalıdır.</p>
<p>Human resources management & Training and Education</p>	<p>1. Our firm needs a formal education program to introduce the KM concept. 2. Our firm needs training on creative thinking, collaborative skills, problem solving, and documentation skills. 3. Our firm needs employee development program that can improve their skills.</p>	<p>1. KMInfraStrctr_HRTrainEdu1 - 34. Şirketimizde BY kavramını tanıtmak için formal bir eğitim programına ihtiyaç vardır. 2. KMInfraStrctr_HRTrainEdu2 - 35. Şirketimizde yaratıcı düşünme, işbirliği becerileri, problem çözme ve dokümantasyon becerileri konularında eğitim programına ihtiyaç vardır. 3. KMInfraStrctr_HRTrainEdu3 - 20. Şirketimizde çalışanlarımızın becerilerini geliştirmek için personel gelişim programları düzenlenmelidir.</p>

Table 32. Construct Model of Control Variables

Control Variables	
<p>Size</p>	<p>Our company has: 1. 1-10 staff 2. 11-50 staff 3. 51-250 staff 4. more than 250 staff</p> <p>(OECD, 2010).</p>

**APPENDIX C: KM MATURITY LEVEL QUESTIONNAIRE ALIGNMENT
AND COMPARISON OF PILOT STUDY RESULTS BETWEEN ORIGINAL
G-KMMM QUESTIONS AND MODIFIED MODEL QUESTIONS**

This is the result of questionnaire alignment and comparison of measurement of KM Maturity Levels through the original model of G-KMMM and our modified Extended Awareness KM Maturity Model that is based on the G-KMMM in a pilot study of one company.

Original G-KMMM:

Model:

Maturity Level of KM & People: 2

Maturity Level of KM & People: 2

Maturity Level of KM Process: 2

Maturity Level of KM Process: 3

Maturity Level of KM & Technology: 3

Maturity Level of KM & Technology: 2

Table 33. Comparison of Pilot Study Results between Original G-KMMM Questions and Modified Model Questions on Same Company

Lv.	No.	Original Question	Answer		English	Aligned Question	Turkish	Answer	
			No	Yes				No	Yes
2	1.	Organizational Knowledge is acknowledged for the long-term success of the organization?		X	<ul style="list-style-type: none"> Well-managed knowledge and its practices should be recognized as the way of enhancing the innovativeness of our firm. Well-managed knowledge and its practices should be recognized as a way for earning long-term growth in our firm. 	<ul style="list-style-type: none"> OPerfM_EffectOP1 - 11. BYS uygulamaları sayesinde iyi yönetilen bilgi şirketimizin yenilikçiliğini geliştirmesini sağlar. OPerfM_EffectOP2 - 12. BYS uygulamaları sayesinde iyi yönetilen bilgi şirketimize uzun vadeli büyüme sağlar. 		X	
	2.	KM recognized as organizational competence ?		X	<ul style="list-style-type: none"> Well-managed knowledge and its practices should be recognized as the way of enhancing the competitive advantage of our firm. 	<ul style="list-style-type: none"> OPerfM_EffectOP3 - 13. BYS uygulamaları sayesinde iyi yönetilen bilgi şirketimizin rekabet avantajını geliştirir. 		X	
	3.	Employees willingly give advice or help each other		X	<ul style="list-style-type: none"> In our firm, there should be collaboration based on all competency of the staffs. 	<ul style="list-style-type: none"> KMAP_KSharing2 - 5. Şirketimizde, personelin ilgi alanlarına ve 		X	

Table 33. Comparison of Pilot Study Results between Original G-KMMM Questions and Modified Model Questions on Same Company (Continued)

				yetkinliklerine dayalı işbirliği olmalıdır.		
3	4.	Any incentive system in to encourage KM?	X	<ul style="list-style-type: none"> Our firm needs monetary and non-monetary incentives to motivate so that the staff encouraged using KMS. (e.g. Promotion). 	<ul style="list-style-type: none"> KMInfraStrctr_MotiveAids1 - 32. Şirketimiz BY'nin uygulanmasını ve BYS kullanımını motive etmek için çalışanlarına teşvikler vermelidir (tatil, maddi destek gibi). 	X
	5.	Incentive systems attractive to promote the KM?	X	<ul style="list-style-type: none"> In our firm, incentive systems should focus on criteria such as knowledge sharing and participation, collaboration, creative thinking, and innovative solutions. 	<ul style="list-style-type: none"> KMInfraStrctr_MotiveAids2 - 33. Şirketimizde teşvik, bilgi paylaşımı ve katkı, takım çalışması, yaratıcılık ve yenilikçi çözümler gibi kriterlere odaklı olmalıdır. 	X
	6.	KM projects coordinated by the management?	X	<ul style="list-style-type: none"> The upper management level needs to encourage the staff to make the KMS successful in our firm. The upper management should initiate, support, and commit to the implementation of KMS in our firm. 	<ul style="list-style-type: none"> KMInfraStrctr_MgmtLeadrsHpSupp1 - 14. Şirketimizde BY/BYS'nin başarılı olması için üst kademe yöneticilerin personeli teşvik etmesi gereklidir. KMInfraStrctr_MgmtLeadrsHpSupp2 - 15. Üst kademe yönetim şirketimizde BY/BYS'nin uygulanmasını başlatıp, desteklemelidir. 	X
	7.	Specific KM roles (CKO (Chief Knowledge Officers/Workers)	X	<ul style="list-style-type: none"> Our firm needs a specific role of staff that manage our firm knowledge (e.g. Chief Knowledge Officer). Our firm needs a specific department that managing knowledge (e.g. Research and Development, KM department, IT department). 	<ul style="list-style-type: none"> KMInfraStrctr_OrgInfra1 - 30. Şirketimizde başlıca görevi bilgiyi yönetmek olan bir personel mevcuttur veya böyle bir personele ihtiyaç vardır (CIO, CKO, BT Müdürü gibi). KMInfraStrctr_OrgInfra2 - 31. Şirketimiz başlıca iş bilgiyi yönetmek olan bir birime ihtiyaç duyar (Bilgi Teknolojileri gibi). 	X
	8.	Formal KM strategy in place?	X	<ul style="list-style-type: none"> Our firm needs clear, well-defined strategy and purpose in implementing the KMS. 	<ul style="list-style-type: none"> KMInfraStrctr_StrategyFinance1 - 29. Şirketimiz BY/BYS'nin 	X

Table 33. Comparison of Pilot Study Results between Original G-KMMM Questions and Modified Model Questions on Same Company (Continued)

Lv.	No	Original Question	Answer		Aligned Question	Aligned Question	Answer						
			No	Yes			No	Yes					
5	15.	KM initiatives resulted in a knowledge sharing culture ?	X	X	<ul style="list-style-type: none"> Our firm needs to develop trust, innovative and collaborative culture for growth and creating novelty products and services. Our firm should frequently explores new operational and product development processes. 	<ul style="list-style-type: none"> KMInfraStrctr_Culture1 - 16. Şirketimiz büyümek ve yeni ürün veya hizmetler sunmak için yenilikçi, güven ve işbirliğine dayalı kültür geliştirmelidir. KMInfraStrctr_Culture2 - 17. Şirketimiz sık sık yeni hizmet ve ürün geliştirme olanaklarını araştırmalıdır. 	X	X					
KM Processes													
2	1.	Routine task documented?	X	X	English	<ul style="list-style-type: none"> The staffs in our firm should make reports and documentation regarding their jobs. 	Turkish	<ul style="list-style-type: none"> KMAP_KCreate3 - 3. Şirketimizde çalışanlar işleri ile ilgili rapor ve dokümantasyon hazırlamalıdır. 	X				
3	2.	KMS improve the quality and efficiency of work?	X	X	English	<ul style="list-style-type: none"> Well-managed knowledge and its practices should be recognized as the way of enhancing the innovativeness of our firm. ICT/IS-based KM enable rapid and faster search, access, and retrieval of information and knowledge in our firm. The ICT-based KM could increase significant level of effectiveness and efficiency in our firm now and in the future. 	<ul style="list-style-type: none"> OPerfM_EffectOP1 - 11. BYS uygulamaları sayesinde iyi yönetilen bilgi şirketimizin yenilikçiliğini geliştirmesini sağlar. KMS_Benefits1 - 25. Şirketimizde BIT/BS-tabanlı bilgi yönetimi sistemleri hızlı arama ve bilgiye daha hızlı erişme için bir araç olarak görülmelidir. KMS_Benefits2 - 26. BIT/BS-tabanlı BYS şimdi ve gelecekte şirketimizin etkinliğini ve verimliliğini önemli düzeyde artırmak için bir araç olarak görülmelidir. 	X	X				
3.	3.	Process for collecting and sharing information formalized?	X	X	English	<ul style="list-style-type: none"> Our firm should have a well-designed central place to store documents and organizational knowledge that every staff can use it. 	<ul style="list-style-type: none"> KMAP_KStorage1 - 22. Şirketimizde kurumsal bilgi ve dokümanların tutulduğu, çalışanların kolaylıkla erişebileceği bilgi merkezi/arşiv olmalıdır. 	X	X				

Table 33. Comparison of Pilot Study Results between Original G-KMMM Questions and Modified Model Questions on Same Company (Continued)

Lv	No	Original Question	Answer		Aligned Question	English	Turkish	Answer						
			No	Yes				No	Yes					
4	4.	—Documented Best practices and lessons learnt	X		<ul style="list-style-type: none"> In our firm, documents and reports related to the firm should be organized clearly and retrievable. 		<ul style="list-style-type: none"> KMAP_KStorage2 - 4. Şirketimizde, belge ve raporlar erişilebilir şekilde düzenlenmelidir. 		X					
										X		<ul style="list-style-type: none"> Our firm needs to construct an evaluation & measurement model to evaluate the effectiveness of the KMS. 	<ul style="list-style-type: none"> OPerfM_Measure1 - 9. Şirketimizde uluslararası standartlara uygun olarak hazırlanacak bir BY/BYS etkinliği değerlendirme modeli oluşturulmalıdır. 	X
5	6.	Existing KM processes be easily adapted to meet new business requirements?	X		<ul style="list-style-type: none"> My firm should be able to innovate within the enterprise (R&D, marketing, production etc.) My firm should be able to absorb innovation and novelty from outside the enterprise. Our firm shall use the previous experiences and knowledge to tackle any problems in the firm. Our firm shall use previous experiences as the base for decision-making process. 		<ul style="list-style-type: none"> KMAP_KCreate1 - 1. Şirketimiz iş süreçlerinde sürekli yenilik yapmalıdır. KMAP_KCreate2 - 2. Şirketimiz kurum dışındaki yenilikleri benimsemelidir. KMAP_KApp1 - 7. Şirketimiz bir sorunu çözmek için önceki bilgi ve tecrübeleri kullanmalıdır. KMAP_KApp2 - 8. Şirketimiz karar verme sürecinde temel olarak önceki deneyimlerini kullanmalıdır. 		X					
										X		<ul style="list-style-type: none"> Our firm should be able to innovate within the enterprise (R&D, marketing, production etc.) 	<ul style="list-style-type: none"> KMAP_KCreate2 - 2. Şirketimiz kurum dışındaki yenilikleri benimsemelidir. 	X
										X		<ul style="list-style-type: none"> Our firm shall use the previous experiences and knowledge to tackle any problems in the firm. 	<ul style="list-style-type: none"> KMAP_KApp2 - 8. Şirketimiz karar verme sürecinde temel olarak önceki deneyimlerini kullanmalıdır. 	X
<i>KM and technology</i>														
2	1.	Pilot IT projects that support KM?		X	<ul style="list-style-type: none"> Our firm needs the ICT-based KM Systems which is built upon the needs and expectations of the staff in managing knowledge. 		<ul style="list-style-type: none"> KMS_FeatureTech1 - 23. Şirketimizde personelin bilgi yönetimindeki ihtiyaçlarını ve beklentilerini karşılamak üzere BİT tabanlı bir BY sistemlerine ihtiyaç vardır. 		X					
										X		<ul style="list-style-type: none"> Our firm shall provide the ICT infrastructure to support the KM activities. 	<ul style="list-style-type: none"> KMS_FeatureTech4 - 24. Şirketimiz BY faaliyetlerini desteklemek için 	X

Table 33. Comparison of Pilot Study Results between Original G-KMMM Questions and Modified Model Questions on Same Company (Continued)

					gerekli olan BT altyapısını sağlamalıdır.	
3	3. KMS support the business unit?	X	<ul style="list-style-type: none"> In our firm, the ICT-based KM Systems should support ONLY to specific managers and/or department and NOT for all staffs. 	<ul style="list-style-type: none"> KMS_FeatureTech3_Uninverted - 28. BİT/BS-tabanlı BYS yalnızca üst yöneticileri ve özel bir bölümü desteklemelidir. 	X	
4	4. KMS support the entire organization?	X	<ul style="list-style-type: none"> The ICT-based KM Systems should support to and be integrated with all business units and business process in our firm. 	<ul style="list-style-type: none"> KMS_FeatureTech2 - 27. BİT/BS-tabanlı BYS tüm personeli desteklemeli ve firmamızdaki tüm iş birimleri ve süreçleriyle entegre olmalıdır. 	X	
	5. KMS integrated with the business processes?	X	<ul style="list-style-type: none"> The ICT-based KM Systems should support to and integrated with all business units and business process in the company. Our firm should use formal networks/media for information exchange with stakeholders and partners. 	<ul style="list-style-type: none"> KMS_FeatureTech2 - 27. BİT/BS-tabanlı BYS tüm personeli desteklemeli ve firmamızdaki tüm iş birimleri ve süreçleriyle entegre olmalıdır. KMAP_KSharing3 - 6. Şirketimiz paydaşlarıyla bilgi paylaşımı için formal ağları ve medyaları kullanmalıdır. 	X	X
5	6. Existing systems continually improved?	X	<ul style="list-style-type: none"> Our firm will always try to improve the KM System based on the previous evaluation. 	<ul style="list-style-type: none"> OPerfM_Measure2 - 10. Şirketimiz daima önceki değerlendirmelere göre BY sistemini geliştirmek için çalışmalıdır. 	X	

APPENDIX D: QUESTIONNAIRE ITEMS



KNOWLEDGE MANAGEMENT SYSTEMS PRACTICES QUESTIONNAIRE

The aim of this study is to find out the importance and the awareness of those factors in the KM practices.
 The examples of KMS are Document Management Systems, Collaborative Systems, Expert Systems, Decision Support Systems, etc. The explanation about Knowledge management and Knowledge Management Systems are provided below. If you already understand the KM and KMS, you may proceed to the questionnaire below. It may take 15-20 minutes to complete.

Knowledge management (KM) is the systematic process of managing the knowledge and information from the inside and outside of the firm. KM helps firm to identify, select, organize, disseminate, transfer, and utilize knowledge, information, and data to be more effective and productive. Knowledge could be tacit (ideas and thought) or explicit (book and document).

Knowledge in a firm could mean anything: documents, archive, innovations, patents, statistics, ideas, news that related and useful to the firm. **Knowledge Management Systems (KMS)** is an ICT (Information Communication Technology) and IS (Information System) based tools that can store and share the company's experiences, documents, ideas, information, and any other forms of knowledge related to the firm. Since KMS also keeps the solutions to the previous problems, it can be used as guidance and decision-making process for the staffs or the managers to act if the similar problem arise. KMS can also be used to create innovation and novelty by looking to the previous experience of company's products and services. The use of ICT and IS in KMS means that the knowledge could be well-organized and be easily and timely efficient to retrieve whenever it is needed.

Firm's Sector: (Multiple Answer Possible) Service-Based Product Manufacture Trading Other:

Firm's Focus: (Multiple Answer Possible) ICT & IS Healthy Machinery Textile Other:

Age of Company: < 1 year 1 – 5 year 5-10 year 10-15 year >15 year

Firm's Workers Number: < 10 people 11 - 50 people 51 - 250 people > 250 people

Annual Gross Income: < USD 1 M USD 1 – 5 M < USD 5 – 15 M > USD 15 M

Your Position: (CEO, CFO, Staff, etc.)

(KM: Knowledge Management; KMS: Knowledge Management Systems; ICT: Information Communication Technology; IT: Information Technology; IS: Information Systems).

Please mark your agreement of all statements with **one of the answer range** options between **“Strongly Disagree”** and **“Strongly Agree”**. At the same time, please also mark each the answer whether you have done the statements with either **“No”** or **“Yes”**.

	Do you agree with the statements?					Have your firm done it?	
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No	Yes
Our firm should be able to innovate within the enterprise (Through R&D, marketing, production, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm should be able to absorb innovation and novelty from outside the enterprise.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The staffs in our firm should make reports and documentation regarding their jobs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In our firm, documents and reports related to the firm should be organized clearly and retrievable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In our firm, there should be collaboration based on all competency of the staffs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm should use formal networks and media for information exchange with stakeholders and partners.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm shall use the previous experiences and knowledge to tackle any problems in the firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm shall use previous experiences as the base for decision-making process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm needs to create an evaluation & measurement standard model to evaluate the effectiveness of the KM/KMS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm will always try to improve the KM System based on the previous evaluation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Well-managed knowledge and its practices should be recognized as the way of enhancing the innovativeness of our firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Well-managed knowledge and its practices should be recognized as the way for earning long-term growth in our firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Well-managed knowledge and its practices should be recognized as the way of enhancing the competitive advantage of our firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The upper management level needs to encourage the staffs to make the KM/KMS successful in our firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The upper management should initiate, support, and commit the implementation of KM/KMS in our firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm needs to develop trust, innovative and collaborative culture in order to grow larger and creating novelty products and services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm should frequently explores new operational and product development processes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
KM should be incorporated with firm's strategy and vision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm shall allocate a sufficient financial budget for the implementation of KMS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm needs employee development program that can improve their skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Do you agree with the statements?					Do your firm has it?	
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No	Yes
Meetings and discussion are necessary in our firm to discuss new ideas and results and to share individual knowledge related to work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm should have a well-designed central place to store organizational knowledge and documents that every staff can use it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm needs the ICT/IS-based KMS, which is built upon the needs and expectations of the staffs in managing knowledge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm shall provide the ICT infrastructure to support the KM activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ICT/IS-based KMS should be regarded as a tool for faster search, access and retrieval of information and knowledge in our firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ICT/IS-based KMS should be regarded as a tool for increasing significant level of effectiveness and efficiency in our firm now and in the future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The ICT-based KMS should support all staff and be integrated with all business units and business process in our firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In our firm, The ICT-based KM Systems should support ONLY to specific managers and/or department and NOT for all staffs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm needs clear and well-defined strategy and purpose in implementing the KM/KMS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm needs a specific role of staff that manage our firm's knowledge (e.g. Chief Knowledge Officer).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm needs a specific department that managing knowledge (e.g. Research and Development, KM department, IT department).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm needs monetary and non-monetary incentives to motivate the staff in doing KM practices and using KMS. (e.g. Promotion).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In our firm, incentive systems should be based on criteria such as knowledge sharing, contribution, teamwork, creativity and innovative solutions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm needs a formal education program to introduce the KM concept.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our firm needs training on creative thinking, collaborative skills, problem solving, and documentation skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What are the most useful of integration ICT and KMS for your firm? (Multiple answers possible).

<input type="checkbox"/> Knowledge Discovery, Searching, and Creation Systems (Data Mining, External Database Subscription, etc.)	<input type="checkbox"/> Knowledge Storage Systems (Document and Archive Management Systems, Database Management Systems, etc.)	<input type="checkbox"/> Knowledge Sharing Systems (e.g. Message Board Systems, Collaborative Systems, Company's Web Portal, etc.)	<input type="checkbox"/> Knowledge Application Systems (Decision Support Systems, Expert Systems, etc.)
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What would motivate your firm to implement or increase KM & KMS practices? (Multiple answers possible).

<input type="checkbox"/> Information Intensity & Overload	<input type="checkbox"/> Difficulty in Tacit Knowledge Capture	<input type="checkbox"/> Use of knowledge management tools or practices by competitors	<input type="checkbox"/> Loss of key personnel and their knowledge	<input type="checkbox"/> Loss of market share	<input type="checkbox"/> Difficulties in incorporating external knowledge	<input type="checkbox"/> Other:
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What are source(s) that triggered or influence your firm to implement KM & KMS practices in your firm? (Multiple answers possible).

Internal	External
<input type="checkbox"/> Management and Stakeholders <input type="checkbox"/> Non-management workers <input type="checkbox"/> Union(s) active in the workplace(s) <input type="checkbox"/> Others:	<input type="checkbox"/> Legislation and Government <input type="checkbox"/> Partner Organization <input type="checkbox"/> Competitors <input type="checkbox"/> Customers and Clients <input type="checkbox"/> Suppliers <input type="checkbox"/> Professional associations or federations <input type="checkbox"/> Universities, research institution and Educational Organization <input type="checkbox"/> Others:

What are source(s) that showing significant barriers/resistance to any of KM/KMS practices in your firm? (Multiple answers possible).

<input type="checkbox"/> Resource Limitations (Human or financial resource limitations)	<input type="checkbox"/> Management and stakeholders Lack of Support/ Interest	<input type="checkbox"/> Employees Lack of Support/ Interest	<input type="checkbox"/> One of Business Units or departments resistance	<input type="checkbox"/> Other:
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Do you have any other comments or suggestions regarding the KM/KMS practices or regarding this questionnaire?

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To be informed/contacted for the further details/results of this research in the future, please put your contact details here:

.....

Thank you for filling the questionnaire

APPENDIX E: SECTOR AND KM AWARENESS AND MATURITY LEVELS

In this part, we test the correlation between the sector of the company and KM practices awareness & maturity level. As have been mentioned earlier, for this part, we exclude the mixed sector. Total sample number for respondents is 85 consists of 50 companies in Service sector, 28 in Manufacture, and 7 companies in Trade sector. Since sector is categorical (nominal that have no meaning) type of variable, I used one-way ANOVA to show the significance value of the correlations.

KM Practices Awareness and Sector of Company

Table 34. One Way ANOVA results of Between Groups of Sector towards Variables of Awareness

Factor	Variable	df	F	Sig.
Organizational Performance	Measurement Tools	2	2.190	.118
	Effects of Organizational Performance	2	.107	.898
KMAP	Knowledge Creation	2	2.570	.083
	Knowledge Storage	2	1.031	.361
	Knowledge Sharing	2	.041	.960
	Knowledge Application	2	1.463	.237
KMS	Benefits of KMS	2	1.710	.187
	Feature of KMS	2	.540	.585
KM Infrastructure	Management Leadership and Support	2	.211	.810
	Organizational Culture	2	1.574	.213
	Organizational Strategy & Finance	2	.556	.575
	Organizational Structure	2	.476	.623
	KM Motivational Aids	2	.273	.762
	Human Resources Management, Training and Education	2	1.076	.346

In table 34, we could see that there is no significant differences of Awareness between sectors (at significance level of 0.05). We could draw conclusions that the awareness may differ in every sector. However, there is no significant difference between sectors that are having higher or lower awareness in KM practices.

KM Maturity Level and Sector of Company

Table 35. One Way ANOVA results of Between Groups of Sector towards KPA of
KM Maturity Level

KPA	df	F	Sig.
KM and People	2	.686	.506
KM Processes	2	1.643	.200
KM and Technology	2	.889	.415

Table 35 shows us that there is no significant differences of the average of KM Maturity Level between sectors in the researched companies (at significance level of 0.05). This means that the Maturity Level of KM may be different in every sector but it is not significant.

APPENDIX F: INDUSTRY AND KM AWARENESS AND MATURITY LEVELS

In this part, we will discuss the correlation between the industry of the researched companies and KM practices awareness & maturity level. Industry is also categorical (nominal that have no meaning) type of variables, where the mean differences could be analyzed through One Way ANOVA. I am also excluding the mixed industry that make total sample size becomes 100 consists of 66 companies in IT industry, 6 companies in Health industry, 5 companies in Machinery industry, and 23 companies running in other industry.

KM Practices Awareness and Industry of Company

We could see the correlation between KM practices awareness and industry in the one way ANOVA table below.

Table 36. One Way ANOVA results of Between Groups of Industry towards Variables of Awareness

Factor	Variable	df	F	Sig.
Organizational Performance	Measurement Tools	3	1.258	.293
	Effects of Organizational Performance	3	1.254	.295
KMAP	Knowledge Creation	3	1.197	.315
	Knowledge Storage	3	.727	.538
	Knowledge Sharing	3	1.572	.201
	Knowledge Application	3	.804	.495
KMS	Benefits of KMS	3	1.436	.237
	Feature of KMS	3	.438	.726
KM Infrastructure	Management Leadership and Support	3	1.221	.306
	Organizational Culture	3	.168	.918
	Organizational Strategy & Finance	3	.449	.719
	Organizational Structure	3	4.161	.008
	KM Motivational Aids	3	2.935	.037
	Human Resources Management, Training and Education	3	.172	.915

Table 36 above shows us that 2 out of 14 variables are significantly different between industries of the researched companies (at the significance level of 0.05).

Significant Correlations

There are two significant differences in the correlation of Industry and KM Practices Awareness in Organizational Structure and KM Motivational Aids. We then look further on the Tukey Test in the means differences.

Table 37. Homogenous and Tukey Test result of Industry and Organizational Structure

Industry	N	Subset for alpha = 0.05	
		1	2
Machinery	5	2.00	
IT	66		3.56
Other	23		3.61
Health	6		3.67

On the Homogenous test results in Table 37 above, we could see that the average of awareness in the Organizational Structure is the lowest in machinery industry with score of 2.00. IT, Health, and Other/Mixed Industry is categorized as group that are having similar characteristics in the test. We could conclude that most of companies in the machinery industry think that Organizational Structure related to KM is less important to be implemented. The second group of industries that are having higher awareness tend to think that the Organizational Structure are more important to be implemented.

Table 38. Homogenous and Tukey Test result of Industry and KM Motivational Aids

Industry	N	Subset for alpha = 0.05	
		1	2
Machinery	5	2.70	
IT	66		3.81
Other	23		3.83
Health	6		4.00

Similar condition happens in the variable of KM Motivational Aids. As shown in Table 38 above, companies in machinery industry think that motivational aids for KM is less important. IT, Other, and Health industry could be categorized as the same groups since they share similar average.

These significant results could be related with both nature of SMEs and machinery industry that uses heavy machine equipment and hardware where the use relies so much on the manual or written instruction. The staff could just follow the instruction

that the special organizational structure for managing company's knowledge is less necessary. The motivational aids is also considered less important in this type of industry because of the technical work they do. The follow up study confirms this result by stating that companies in machinery industry are more practical whose activities based on best practices that suits best their businesses.

KM Maturity Level and Industry

Table 39. One Way ANOVA results of Between Groups of Industry towards KPA of KM Maturity Level

KPA	df	F	Sig.
KM and People	3	1.042	.378
KM Processes	3	1.236	.301
KM and Technology	3	1.631	.187

Similar with the correlation of KM Maturity Level and Sector, the type of industry has no significant differences towards KM Maturity Level (at significance level of 0.05). We could conclude that the KM Maturity Level of researched companies could not be determined by the type of industry they have.

APPENDIX G: FOLLOW UP STUDY QUESTIONS

The questions in the follow-up study are:

- In your company, is R & D important for innovation?
- According to our findings, medium and older companies and have more financial support are less aware of the KM activities for R & D for new products and services. However, they do better in maturity level of KM processes and KM and Technology. What is your opinion about this?
- According to our findings, companies in bigger cities have lower awareness of KM in many knowledge sharing, knowledge application, KM strategy and finance, and human resources aspects. However, they do better in maturity level of KM processes and KM and Technology. What is your opinion about this?
- According to our findings, companies in machinery industry have lower awareness in awareness of Organizational Structure for KM and KM Motivational Aids. What is your opinion about this?
- Do you think your company will try to implement the KM/KMS practices better in the future?
- What other external parties could do to make the KM practices becomes better in Turkish SMEs? (government, universities, other organizations, Technopark, etc.)

APPENDIX H: CURRICULUM VITAE

PERSONAL INFORMATION

Full name : Muhamad Prabu Wibowo.

Place and date of birth : Jakarta, January 27th, 1987.

Nationality : Indonesia.

PREVIOUS FORMAL EDUCATION

Sept. 2013 : Erasmus Program in Computer Science, Blekinge Institute of Technology.

2010 – 2011 : Turkish Language, Diploma, Ankara University, Turkey.

2004 – 2008 : Bachelor Degree of Library and Information Science, Faculty Humanities, University of Indonesia. (FIB UI). **Undergraduate Thesis Title:** Analysis of Maturity Level of Monitoring and Evaluation of Information Technology Performance with COBIT (Control Objective for Information and Related Technology: Case Study in University of Indonesia's Library

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

- Fen Bilimleri Enstitüsü
- Sosyal Bilimler Enstitüsü
- Uygulamalı Matematik Enstitüsü
- Enformatik Enstitüsü
- Deniz Bilimleri Enstitüsü

YAZARIN

Soyadı : WIBOWO
Adı : Muhamad Prabu
Bölümü : Bilişim Sistemleri

TEZİN ADI (İngilizce) : Knowledge Management Awareness and Maturity Levels of Small and Medium Enterprises (SMES) in Technoparks of turkey

TEZİN TÜRÜ : Yüksek Lisans Doktora

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir.
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir.
3. Tezimden bir (1) yıl süreyle fotokopi alınamaz.

TEZİN KÜTÜPHANEYE TESLİM TARİHİ :