ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY

AN EMPRICAL STUDY ON FACTORS AFFECTING FIRM INNOVATION CAPABILITY AND KNOWLEDGE SHARING

M.Sc. THESIS

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Industrial Engineering Programme

Thesis Advisor: Prof. Dr. Ramazan Evren

JUNE 2012

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FİRMA İNOVASYON YETERLİLİĞİ VE BİLGİ PAYLAŞIMINI ETKİLEYEN FAKTÖRLER ÜZERİNE AMPİRİK BİR ÇALIŞMA

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To my parents,

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ABBREVIATIONS

COM	**:** Competitiveness
CON	**:** Conscientiousness
IN	**:** Firm Innovation Capability
KS	**:** Knowledge Sharing
L	**:** Learning Orientation
NL	**:** Need for Learning
O	**:** Openness for Experience
P	**:** Performance Orientation
S	**:** Shared Vision
SE	**:** Knowledge Self-Efficacy
T	**:** Trust in Peers

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AN EMPRICAL STUDY ON FACTORS AFFECTING FIRM INNOVATION CAPABILITY AND KNOWLEDGE SHARING

SUMMARY

Innovation is one of the most important way to maintain a competitive advantage in today's highly dynamic and fast-paced world. The uncertainty revolving around the global markets requires a fast response from the companies. This fast response, in the form of new ideas, products, services and processes are created by innovation activities. As the importance of innovation increases, companies are paying increasing attention to the factors that affect innovation performance. The dramatic technological developments in the 21st century enable companies to keep up the pace with changes. The development in information technologies made knowledge management a crucial problem. Knowledge creation, as a part of knowledge management, has emerged as a popular subject for both researchers and companies.

Knowledge creation is a prerequisite of innovation. One of the initiators of knowledge creation is sharing the existing knowledge. Knowledge, by definition, can be transferred and then used in new knowledge creation process. There are many different individuals in organizations with knowledge on many different areas. This pile of knowledge improves and expands as knowledge is shared among individuals and transformed into new knowledge.

The purpose of this study is determining the factors that affect firm innovation capability and knowledge sharing. The main hypothesis of the study is that knowledge sharing has a positive impact on firm innovation capability. Furthermore, factors affecting knowledge sharing were investigated with the variables learning orientation, performance orientation, trust in peers, shared vision, knowledge self-efficacy, openness, conscientiousness, competitiveness and need for learning. 24 different hypotheses were proposed and 3 models were designed to test the hypotheses.

In order to empirically test the models, a questionnaire was prepared based on the previous studies in literature. A 43-item questionnaire was constructed, except demographic questions, to measure 11 variables. The questionnaire then was sent to selected companies from the top 500 companies and prominent SMEs from Turkey. 221 participants responded to the survey. The gathered data were tested with regression analysis and hypotheses were tested.

After data analysis, the results show that knowledge sharing has a positive impact on firm innovation capability. Also, learning orientation has a positive and performance orientation has a negative effect on knowledge sharing. Furthermore, conscientiousness and trust in peers positively affects knowledge sharing whereas competitiveness has a negative effect. Need for learning and conscientiousness have a positive impact on learning orientation and competitiveness has a positive impact on performance orientation.

This study proposed hypotheses about knowledge sharing, firm innovation capability and other variables chosen based on previous studies in the literature. The validity of the hypotheses were tested by analyses and relationships were discovered between the selected variables. For future research, different hypotheses with different variables sets can be constructed.

FİRMA İNOVASYON YETERLİLİĞİ VE BİLGİ PAYLAŞIMINI ETKİLEYEN FAKTÖRLER ÜZERİNE AMPİRİK BİR ÇALIŞMA

ÖZET

Günümüzün hızlı değişen dinamik dünyasında rekabetçiliği korumanın en önemli yollarından biri inovasyondur. Küresel pazarları çevreleyen belirsizlik, şirketleri değişimlere çabuk cevap vermek zorunda bırakmaktadır. Bu hızlı cevap, yeni fikir, ürün, hizmet ve süreç gibi inovasyon aktiviteleri tarafından yaratılmaktadır.

İnovasyon, yeni veya anlamlı ölçüde değiştirilmiş ürünlerin, yöntemlerin veya süreçlerin kullanıma sunulması veya uygulanması olarak tanımlanmaktadır. İnovasyon ürünler veya süreçler üzerinde geliştirilebildiği gibi, pazarlama ve organizasyonel yönetimle alakalı inovasyonlar da yapılabilmektedir.

İnovasyon organizasyonların ve hatta ülkelerin rekabetçiliğini belirleyen en önemli unsurlardan biridir. İnovasyonun önemi arttıkça, şirketler inovasyon performansını etkileyen faktörlere ilgi duymaktadır. Bir firmanın inovasyon yeterliliği bilgiyi yönetme, koruma ve yaratma ile yakından ilgilidir. 21. Yüzyılın getirdiği dramatik ölçüde hızlı teknolojik gelişmeler, şirketlere değişen pazarların hızına ayak uydurabilme imkanı sağlamaktadır. Bu noktada ana amaç gelişen bilgi teknolojilerini en üst seviyede ve en geniş kullanım alanlarında aktif olara kullanmayı sağlamaktır. Bilgi teknolojileri geliştikçe bilgiyi yönetmek önemli bir sorun haline gelmiştir. Bilginin organizasyonların her seviyesinde akışını sağlamanın ötesinde, yeni bilgi üretimi hem araştırmacıların hem de şirketlerin ilgilendiği bir konu olarak ortaya çıkmıştır.

Yeni bilgi üretimi ortaya yenilikler koyabilmenin ön şartı olarak önümüze çıkmaktadır. Bilgi üretiminin ön koşullarından biri de var olan bilginin paylaşılarak yeni bilgi üretim sürecine katılmasıdır. Bilgi paylaşımı her türlü inovasyonun başlatıcısı olduğundan şirketler açısından önemli bir rekabet unsurudur.

Genel olarak kabul edilen bir tanıma göre açık ve örtülü bilgi olak üzere iki tür bilgi bulunmaktadır. Açık bilgi, sayılarla, kelimelerle rahatça ifade edilen ve aktarımı kolay olan bilgi anlamına gelmektedir. Açık bilgi metin, çizim, tablo, fotoğraf, bilgisayar yazılımı, veritabanı gibi farklı şekiillerde varolabilir. Tüm bireyler tarafından erişimi kolaydır. Örtülü bilgi ise kolayca ifade edilebilir veya incelenebilir değildir. Tecrübeler, kişisel görüşler, sezgiler gibi faktörler yüksek oranda kişiseldir ve formüle edilmesi mümkün değildir. Bu tür bilginin kaynağı çalışanlar ve organizasyonun kültürüdür. Şirketlerin bilgi paylaşımı konusundaki asıl amacı örtülü bilgileri paylaşıp yaygınlaştırarak açık bilgiye çevirerek rekabetçi avantaj elde edebilmektir.

Bilgi, tanımı gereği kişiler arasında transfer edilebilmektedir. Organizasyonlarda bireyler kendi uzmanlık alanlarıyla ilgili geniş bilgi dağarcıklarına sahiptir. Çok sayıda farklı alanlarda bilgilere sahip bireylerin bir araya gelerek oluşturdukları bilgi havuzu, aralarındaki bilgi paylaşımları sayesinde genişleyerek yeni bilgiler olarak

ortaya çıkmaktadır. Bilgi paylaşımının gerçekleşmesi kişisel ve organizasyonel gelişim açısından hayati önem taşımaktadır. Bir firmanın bilgiyi aktarma ve kullanabilme yeteneği organizasyonel inovasyon seviyesi, problem çözme yetisi ve yeni verilere çabuk tepki verebilmesi ile doğrudan ilişkilidir. Yeni bilgileri edinme ve bunları organizasyona entegre etme konusunda başarılı şirketlerin rakiplerinin takip etmekte zorlanacağı, büyük yaratıcılık gerektiren benzersiz yeni fikir ve ürünler ortayakoyabilme konusundaki potansiyeli daha yüksektir. Bu da daha yüksek bir inovasyon seviyesine işaret etmektedir.

Bu çalışmanın amacı birbirleriyle büyük ölçüde ilişkiye sahip olan firma inovasyon yeterliliğini ve bilgi paylaşımını etkileyen faktörleri ortaya koymaktır. Çalışmanın ana varsayımında bilgi paylaşımının firma inovasyon yeterliliğini pozitif olarak etkilediği hipotezi oluşturulmuştur. Bununla birlikte bilgi paylaşımını etkileyen alt faktörler olarak öğrenme eğilimi, performans eğilimi, iş arkadaşlarına güven, ortak vizyon, sahip olunan bilgiye güven, açıklık, sorumluluk, rekabetçilik ve öğrenme isteği belirlenerek bu değişkenler ile bilgi paylaşımı açıklanmaya çalışılmıştır. Toplamda oluşturulan 24 hipotez, 3 farklı modelde incelenerek doğrulukları araştırılmıştır.

İlk modelde bilgi paylaşımının firma inovasyon yeterliliğine olan etkisi ile iş arkadaşlarına güven, ortak vizyon, sahip olunan bilgiye güven, açıklık, sorumluluk, rekabetçilik ve öğrenme isteğinin bilgi paylaşımına olan etkileri incelenmiştir. Bu model ile alakalı toplam 8 hipotez ortaya konulmuştur.

İkinci modelde yine aynı şekilde temel hipotez olan bilgi paylaşımının firma inovasyon yeterliliği üzerine olan etkisi incelenmiştir. Bununla birlikte öğrenme eğilimi ve perfomans eğilimi değişkenleri modele dahil edilerek yeni bir yapı oluşturulmuştur. Bu bağlamda tüm diğer değişkenlerin öğrenme ve performans eğilimine olan etkileri incelenmiştir.

Üçüncü ve son modelde ise ilk iki modelin birleşimi olan bir yapı oluşturularak temel hipotez dışında öğrenme eğilimi, performans eğilimi, iş arkadaşlarına güven, ortak vizyon ve sahip olunan bilgiye güven değişkenlerinin bilgi paylaşımına; açıklık, sorumluluk, rekabetçilik ve öğrenme isteği değişkenlerinin ise öğrenme ve performans eğilimine olan etkileri incelenmiştir.

Modellerin deneysel olarak test edilebilmesi için literatürde daha önceki çalışmalardan yola çıkarak bir anket hazırlanmıştır. Anket içerisinde cinsiyet, yaş, sektör, pozisyon gibi demografik sorular ve belirlenen 11 değişken için toplam 43 soru bulunmaktadır. Anket sorularının güvenilirliği istatistiksel metodlarla ölçülmüş olup, uygun olduğu görülmüştür. Bu anket yardımıyla katılımcıların ve içerisinde görev aldıkları şirketlerin çeşitli değerleri ölçülerek modelin test edilmesi amaçlanmıştır. Bu bağlamda anket Türkiye'nin en büyük 500 şirketi ve önde gelen KOBİ'lerinin arasından seçilen şirketlere bilgisayar ortamında veya basılı halde gönderilerek veri toplanmıştır. Anket toplamda 221 katılımcı tarafından doldurulmuştur. Anket yoluyla edinilen veriler öncelikle analize uygunluğu test edilerek incelenmiş ve hazırlanan veri seti regresyon analizi ile incelenerek hipotezlerin doğruluğu test edilmiştir.

Verilerin analizleri sonucunda bilgi paylaşımının firma inovasyon yeterliliğini pozitif olarak etki ettiği sonucuna ulaşılmıştır. Ayrıca kişilerin öğrenme eğiliminin bilgi paylaşımına pozitif, performans eğilimininse bilgi paylaşımına negatif etkileri olduğu ortaya çıkarılmıştır. Bunların yanı sıra sorumluluk ve iş arkadaşlarına güven bilgi paylaşımını pozitif, rekabetçilik ise bilgi paylaşımını negatif olarak etkilemektedir.

Öğrenme isteğinin ve sorumluluğun öğrenme eğilimi üzerine olan pozitif etkileri olduğu saptanmıştır. Rekabetçilik ise performans eğilimini pozitif olarak etkilemektedir.

Bu çalışmada literatür taraması sonucunda karar verilen değişkenler ile bilgi paylaşımı ve firma inovasyon yeterliliği arasındaki ilişkiler araştırılmıştır. Analizler sonucunda ortaya konulan hipotezlerin doğruluğu test edilerek, kullanılan değişkenler arasındaki ilişkilere ulaşılmıştır. İleride yapılacak çalışmalarda farklı değişken setleri kullanılarak farklı sonuçlar elde edilebilir. Bunun yanında cinsiyet, yaş, pozisyon gibi demografik gruplara özel analizler yapılarak farklı demografik grupların bilgi paylaşımına olan yaklaşımları incelenebilir.

1. INTRODUCTION

In recent few decades, globalization and rapid development of technology have drastically changed what organizations need to do in order to maintain their competitiveness. In the midst of uncertainity, knowledge is one of the most important sources of lasting competitiveness. As there can be drastic changes to markets, technologies and competitiors that could make products and services obsolete in very short amounts of time, it is important for companies to create new knowledge, disseminate it through the organization and use it to create new technologies and products (Nonaka, 1991).

Technological developments created a highly competitive environment in the world, and the organizations must be ready to respond to increasing change around them quickly. In order to be able to do this, the companies need to obtain knowledge and process it in a way that would result in new processes, products or service answering the wishes of the customers. This can be accomplished by creating, sharing and managing knowledge effectively.

Knowledge, by definition, can be transferred to others. Individuals in an organization embody different kinds of knowledge related to their fields. As an organization consists of many different individuals that have knowledge on different subjects, it is vital for the organization to share their knowledge with others in order to improve both at an individual and organizational level. Knowledge sharing is crucial to the organization, as it is the main way of adapting new knowledge and transforming this new knowledge to new ideas.

The process of transforming ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace is called innovation. Innovation is a result of knowledge creating and adapting process in organizations. Organizations need to innovate to be able to answer the changing customer demands and lifestyles and in order to capitalise on opportunities offered by technology and changing marketplaces, structures and

dynamics. Organizational innovation can be performed in relation to products, services, operations, processes, and people (Baregheh et al., 2009).

The main purpose of this study is to analyze effects of knowledge sharing within a company on its innovation capability by proposing a model that links determinants of knowledge sharing, knowledge sharing process and firm innovation capability. A questionnaire was applied in order to test the validity of the proposed model and the hypotheses proposed by the model are tested with the data gathered. This study aims to reveal the factors that affect knowledge sharing in a company, and show the relationship between knowledge sharing and innovation.

The next section includes information about knowledge, knowledge management, knowledge sharing and refers to the studies conducted in this field. The following section covers innovation, the types of innovation and gives information about innovation's relation to knowledge management. In fourth section, the proposed model and the methodology of the study is presented. Analysis and results are explained in fifth section and finally the last section conludes the study with the interpretations of the results and further discussions and recommendations regarding the subject.

2. KNOWLEDGE AND KNOWLEDGE SHARING

2.1 Definition of Knowledge

The concept of knowledge is often confused with other concepts, especially with data and information.

Data, in most basic sense, are the factual content of the information (Melkas & Harmaakorpi, 2008). Data are carriers of knowledge and information, the tool through which knowledge and information can be stored and transferred. Information and knowledge are communicated through data, and by means of data storage and transfer devices and systems. Therefore, it can be said that data only becomes information or knowledge after it is interpreted by its receiver (Kock et al., 1997).

Kettinger and Li (2010) defines information as the meaning produced from data based on a knowledge framework that is associated with the selection of the state of conditional readiness for goal-directed activities. In other words, when data are put through a process in order to reach a meaning, it becomes information.

Knowledge is a combined flow of information, experience, values, expertise and intuition. It creates an environment that will develop new experience and information. It is, in short, information in action. Decisions, successes, failures, creations, plans are a part of knowledge creation process which makes it differ from information (Tiwana, 2000).

Knowledge includes both data and information concepts. It is the mixture of information and experiences of the subject, an in this sense it is the result of personalization of different pieces of information. According to Nonaka and Takeuchi (1995), while information and knowledge is often used to replace each other there is a distinct difference between them. Information provides a new way of interpreting events or objects, which makes it necessary to create and construct knowledge. Information is a flow of messages, and that flow creates the knowledge. However, unlike information, knowledge is affected by beliefs and commitment of the individual holding it, which makes knowledge subjective.

2.2 Types of Knowledge

There are different classifications of knowledge in literature. However, the most commonly used classification is tacit knowledge and explicit knowledge, proposed by Nonaka and Takeuchi (1995).

2.2.1 Explicit knowledge

Explicit knowledge can be expressed in words, and numbers, and easily communicated and shared in form of hard data, scientific formulae, codified procedures or universal principles. It could be in form of text, graph, table, photo, computer software, database or schematics. It is ready to process and easy to access for all individuals. It is easy to share through different means.

2.2.2 Tacit knowledge

Tacit knowledge is not easily visible or expressible. It is experiences, subjective insights, intuitions and hunches; highly personal and hard to formalize. Employees and the culture of organization are the primary sources of tacit knowledge. Its subjective nature makes tacit knowledge difficult to process, share or store.

Companies need to convert tacit knowledge to explicit knowledge in order to gain a competitive advantage. With the assumption that knowledge is created through the interaction between tacit and explicit knowledge, a conversion model that includes four types of knowledge conversions was created.

Table 2.1 : Four modes of knowledge conversion (Nonaka and Takeuchi, 1995).

	Tacit Knowledge	**Explicit Knowledge**
Tacit Knowledge	Socialization	Externalization
Explicit Knowledge	Internalization	Combination

Socalization is the process of sharing tacit knowledge, essentially experiences. Through shared experiences, new tacit knowledge such as mental models and technical skills are created.

Externalization is a process of articulating tacit knowledge into explicit concepts. It is the essential knowledge creation process, in which tacit knowledge takes the shapes of metaphors, analogies, concepts, hypotheses or models. This is a creative process, which can lead to the discovery of new meanings and paradigms.

Combination is the process of combining different explicit concepts into a knowledge system. Individuals exchange and combine knowledge through different means such as documents, meetings, conversations and computerized networks. Reconfiguration of existing knowledge can lead to new knowledge.

Internalization is a process of embodying explicit knowledge into tacit knowledge. When knowledge gathered through socialization, externalization and combination are internalized into individuals' tacit knowledge; they become valuable assets (Nonaka and Takeuchi, 1995).

It can be deduced that organizational knowledge creating process starts with individuals sharing knowledge with each other.

2.3 Knowledge Sharing

Knowledge sharing is defined as the "provision or receipt of task information, know-how and feedback reagarding a product or a procedure" (Cummings, 2004). Knowledge sharing means diffusing individuals' existing knowledge with other members in their organization. In this sense, knowledge sharing is catalyst of the knowledge creating process, as all knowledge creating processes start with a form of knowledge sharing. It is essential in order to complete the conversion of individual knowledge to organizational knowledge.

Knowledge sharing occurs in both at the individual and organizational level. For employees, knowledge sharing is talking to colleagues or help them get something done better, more quickly or more efficiently. For an organization, knowledge sharing is capturing, organizing, reusing and transferring experience based knowledge that resides with the organization and making that knowledge available to remaning members of the organization (Lin, 2007).

In all knowledge sharing processes between individuals, there is a knowledge source and a knowledge receiver along with a demand for knowledge and a supply of knowledge. From this perspective, Van den Hooff and van Weenen (2004) proposed two central processes within knowledge sharing:

- Knowledge donating can be defined as iIndividuals communicating their personal intellectual capital to others.

- Knowledge collecting is process of consulting colleagues in order to get them to share their intellectual capital.

Knowledge sharing is very important for companies to be able to improve their skills and competences, gaining a competitive advantage. Innovation occurs in environments which the individuals share and combine their personal knowledge with others (Matzler et al., 2008). The importance of knowledge sharing lies in its results for the company. In order to be able to improve knowledge sharing, it is necessary to analyze its determinants.

2.4 Previous Studies on Factors Affecting Knowledge Sharing

There are many studies in literature regaring the determinants of knowledge sharing. As knowledge sharing initially happens at individual level, personality traits affect the knowledge sharing behavior within an organization. Also, it has been proposed that individual's goal orientation affects knowledge sharing behavior. In addition, there are organizational factors as determinants of knowledge sharing processes, as the managements influence the climate around the organization. In this section, different studies from literature are analyzed in order to determine the commonly used determinants of knowledge sharing.

Goal orientations are an important structural theory that explains expected outcomes of individual's achievement- orientated goals. Individuals behave differently depending on their tendency to embrace a learning or performance goal orientation while completing a task. Learning orientation leads to a development process where individuals try to foster their abilities and develop their competencies during the task which leads to an overall positive experience and outcomes. Performance orientated invididuals are focused on the results of their tasks, aim for successful outcomes and positive feedbacks from others (Creed et al., 2010). Because of the main difference between two types of goal orientation, they have opposite effects on knowledge sharing behavior. Individuals with learning orientation have a positive attitude towards learning and are open to knowledge sharing as they see their capabilities as shapeable and developable. Individuals with performance orientation does not invest time in learning and knowledge sharing activities as they focus on the positive results and avoid negative feedback, which leads to a negative relationship between knowledge sharing behavior and performance orientation (Matzler et al. 2011).

Openness is one of the big five personality traits and implies active imagination, intellegance and engagement in ideas-related endeavours (Milfont and Sibley, 2012). This can be interpreted as open people have the tendency to engage in experiences that involve learning and knowledge transfer. Matzler and Mueller (2011), proposed that openness is a prerequisite of learning and consequently openness positively influences learning orientation while it has a negative effect on performance orientation and the reults of the study showed that there is a negative relationship between openness and performance orientation.

Conscientiousness is another one of the big five personality traits. Conscientiousness reflects dependability, being careful, through, responsible, organized and planful. It is related to job performance as it assesses personal characteristics such as persistent, careful, responsible and hardworking, which are important attributes for accomplishing work tasks in all jobs (Barrick & Mount, 1991). Conscientiousness is a characteristic that positively influences individuals' learning orientation and knowledge sharing behavior (Matzler et al. 2008; Matzler & Mueller, 2011).

Need for learning is a motivator for employees to find information, to build up an understanding of the environment and to engage in high-level information processing. Consequently, need for learning positively influences learning orientation (Harris et al., 2005; Matzler & Mueller, 2011).

Competitiveness involves "the enjoyement of interpersonal competition and the desire to win and be better than others. Competitiveness has a positive impact on performance and positively influences performance orientation (Matzler & Mueller, 2011).

Enjoyment in helping others is a product of altruism concept. Lin (2007), found that employees are instinctively contribute in knowledge sharing processes, as engaging in intellectual conversations and solving problems are challenging and pleasurable; therefore it significantly increase the willingness to participate in knowledge collecting and knowledge donating. The study of Rahab et al. (2011) yielded similar results, showing that someone that have a liking for helping others has a tendency to share and collect knowledge willingly.

Self-efficacy is defined as the judgements of individuals regarding their capabilities to organize and execute courses of action required to achive specific leves of performance. Employees who believe that they can improve the performance of the organization, will develop willingness to share knowledge (Lin, 2007). Rahab et al. (2011) however, found no relationship between self-efficacy and knowledge sharing.

Shared vision establishes a common purpose and direction for the organization. Individuals with the same goals and expectations are more inclined to collaborate and participate in a knowledge sharing behavior, therefore shaared vision positively influences knowledge sharing (Liao, 2006).

Lin (2007) proposed that top management support and organizational rewards as organizational factors that affect knowledge sharing behavior. Top management support would increase the amount of knowledge sharing through the organization. Organizational rewards imply that employees would get rewards, ranging from monetary incentives to non-monetary awards such as promotions and job security. It is expected that if offered organizational rewards, employees would have greater willingness to share knowledge. The results show that while top management support positively corrolates with the knowledge sharing behavior, organizational rewards have no effect on knowledge sharing.

Open-mindness is another organizational level factor that affects knowledge sharing. It implies the willingness to criticize the operations, beliefs and routines of the organization and accept new ideas and provies and environment that supports exchanging knowledge and ideas, and positively influences the knowledge sharing behavior of the employees (Liao, 2006).

Information and communication technology use provide numerous new methods and applications for knowledge sharing and remove geographical boundaries. Lin (2007)'s study shows that while ICT use increases knowledge collecting, it has no effect on knowledge donating. This could be interpreted as employees using ICT as a means to reaching knowledge rather than sharing their own with others.

Interpersonal trust at workplace is defined as the willingness of a party to bevulnerable to the actions of another party on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party (Mayer et al., 1995). The influence of trust in

workplace on knowledge sharing has been tested by different studies. Mooradian et al. (2006), applied a two level variable; interpersonal trust in peers and interpersonal trust in management and found that trust in peers positively influenced knowledge sharing within both individual's workgroups and across other workgroups. Liao (2006) yielded similar results for trust in management and the organization, both positively affecting knowledge sharing behavior.

3. INNOVATION

Innovation can be definedas the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organizations or external relations. The minimum requirement for an innovation is that the product, process, marketing method or organsational method must be new (or significantly improved) to the firm (European Commission, 2005).

The minimum requirement for an innovation is that the product, process, marketing method or organisational method must be new (or significantly improved) to the firm. This includes products, processes and methods that firms are the first to develop and those that have been adopted from other firms or organisations.

Innovation activities are all scientific, technological, organisational, financial and commercial steps which actually, or are intended to, lead to the implementation of innovations. Some innovation activities are themselves innovative, others are not novelactivities but are necessary for the implementation of innovations. Innovationactivities also include R&D that is not directly related to the development of a specific innovation.

A common feature of an innovation is that it must have been implemented. A new or improved product is implemented when it is introduced on the market. New processes, marketing methods or organisational methods are implemented when they are brought into actual use in the firm's operations.

3.1 Types of Innovation

3.1.1 Product innovation

A product innovation is the introduction of a good or service that is new or significantly impoved with respect to its characteristics or intended uses. This

includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.

Product innovations can utilise new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies.

3.1.2 Process innovation

Process innovation can be defined as the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques equipment and/or software. Process innovations can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products.

3.1.3 Marketing innovation

Marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. Marketing innovations are aimed at better addressing customer needs, opening up new markets, or newly positioning a firm's product on the market with the objective of increasing the firm's sales.

3.1.4 Organizational innovation

An organizational innovation is the implementation of a new organisational method in the firm's business practices, workplace organization or external relations. Organizational innovations can be intended to increase a firm's performance by reducint administrative costs or transaction costs, improving workplace satisfaction and thus labor productivity, gaining access to non-tradable assets such as non-codified external knowledge or reducing costs of supplies.

3.2 Previous Studies on Innovation and Knowledge Sharing

Innovation is widely recognized as a key factor in the competitiveness of nations and firms. It is essential for economic development and critical for firms to remain competitive. Its importance is intensified by increased global competition, decreased

product lifecycles, increased technological capabilities of firms, and rapidly changing consumer demands (Guijarro et al., 2006).

It is widely accepted that a firm's innovation capability is closely linked to its ability to manage, maintain and create knowledge. However, organizations cannot create knowledge without individuals, who therefore play a critical role in knowledge-creation and innovation processes (Camelo-Ordaz et al., 2011).

According to Nonaka and Takeuchi (1995), knowledge creation and innovation should be understood as a process by which the knowledge held by individuals is enlarged and internalized as a part of organizational knowledge. The idea underlying this statement is that the knowledge possessed by individuals must be transferred to the levels of the group and the organization as a whole, so that it can be applied, giving rise to innovation.

The relevance of knowledge sharing for innovation has been theoretically argued in several studies. Cohen and Levinthal (1990) considered that the interaction among individuals who possess different knowledge improves the organization's ability to innovate. Boland and Tensaki (1995) stated that the innovation capability of the organization is the result of the interaction among individuals who possess different kinds of knowledge. Similarly, several authors argue that knowledge sharing among employees constitutes a fundamental step in the process of organizational knowledge creation, in such a way that if it is not effectively performed, it can constitute a serious barrier to the development of this process, and as a consequence, to innovation effectiveness (Ipe 2003).

Recent empirical studies also support the relationship between knowledge sharing and innovation. Liao et al. (2006) used knowledge sharing as a determinant of firm innovation capability and found a significant relationship between the two variables.

Similarly, Saenz et al. (2009), showed that knowledge sharing is a key issue in order to enhance the innovation capability of firms. Moreover, having a knowledge vision which is known and shared by the members of an organization is an essential element in order to guarantgee the effectiveness of the aforementioned process.

Lin (2007), proposed similar findings; stating that employess willingness to both donate and collect knowledge is significantly related to firm innovation capability.

The findings suggest that innovation involves a broad process of knowledge sharing that enables the implementation of new ideas, products, processes or services.

4. RESEARCH MODEL AND METHODOLOGY

In order to explain the factors affecting knowledge sharing and its relationship with firm innovation capability, it is needed to develop a model to explain the determinants of knowledge sharing and firm innovation capability. In this section, the proposed model, hypotheses regarding this model, the variables of the research and the methods are explained.

4.1 Research Hypotheses

4.1.1 Knowledge sharing

A firm's ability to transform and exploit knowledge may determine its level of organizational innovation, problem-solving capability and rapid reaction to new information. A firm that is capable of rathering and integrating knowledge is more likely to produce unique and rare ideas that are difficult for rivals to replicate, thus leading to a high level of innovation capability (Lin, 2007). The ability to exploit external knowledge is critical to the innovation process. Innovative firms create uniques products, structures, or operations. To be able create unique functions, a diversity of knowledge and the ability to share it throughout the organization is required (Liao, 2006). When two people share their knowledge with others and receive feedback questions, amplifications, and modifications, the benefits become exponential. This leads to a knowledge-based competitive advantage as knowledge sharing has a positive relationship with innovation capability (Liao et al. 2006).

Knowledge sharing is one of the prerequisites of knowledge creation. As knowledge sharing activities and behavior becomes common in a company the amount of knowledge processed and created increase. Creation of new knowledge implies new ideas, new products, and new processes. Knowledge sharing is a competitive advantage for the companies as it is an initiator and motivator of all types of innovation activities. Thus, we form the following hypothesis:

Hypothesis 1: Knowledge sharing has a positive impact on firm innovation capability.

4.1.2 Learning orientation

Learning orientation can be conceptualized as giving rise to the set of organizational values that influence the tendency of the firm to create and use knowledge (Sinkula et al., 1997). Learning oriented individuals focus on the development of new skills and the mastery of the new situations and value the process of learning itself. They realize that in order to be able to develop new practices a certain effort is required. They are interested in development of skills and knowledge enchanment both of themselves and their colleagues (Matzler & Mueller, 2011).

As knowledge sharing is one of the initiators of creating new knowledge and learning process in organizations, learning oriented individuals will be more inclined to share their knowledge with others and collect their knowledge in order to develop their own knowledge.

Thus, we form the following hypothesis:

Hypothesis 2: Learning orientation has a positive impact on knowledge sharing.

4.1.3 Performance orientation

Performance oriented individuals want to be successful, outperform others and demonstrate their competency. They are concerned with showing evidence of their abilities. Thus, these employees will not be willing to give away their competitive advantages against others, and will not participate in knowledge sharing (Matzler & Mueller; 2011).

Knowledge sharing is a process of improving and creating knowledge by combining different parts of individual knowledge around an organization, and both at individual and organizational knowledge levels. Individuals with the tendency to focus on their performance and wish to outperform others in order to get positive feedback will not participate in knowledge sharing activities and try to accomplish things on their own.

We hypothesize:

Hypothesis 3: Performance orientation has a negative impact on knowledge sharing.

4.1.4 Openness to experience

Openness to experience is linked to traits such as imaginability, curiosity, artistic sensitivity and originality, as opposed to conventionalism. It reflects an individual's curiosity and originality; also shows whether they would seek other people's insights (Cabrera et al., 2006). It is an indicator of how invested individuals are in seeking new solutions and gains (Milfont & Sibley, 2012). Individuals with high leves of openness are curious about both inner and outer worlds and are willing to consider new ideas and unconventional values (Matzler et al., 2008). A low score on openness implies a negative attitude towards engaging in learning experience and a lack of curiosity for new ideas (Matzler & Mueller, 2011).

Openness to experience is an indicator of individuals' will to seek and embrace new ideas and knowledge. People with high scores in openness would be inclined to learn new things, develop new skills and more likely to contribute when others need their help.

Thus, we form the following hypotheses:

Hypothesis 4: Openness to experience has a positive impact on learning orientation.

Hypothesis 5: Openness to experience has a negative impact on performance orientation.

Hypothesis 6: Openness to experience has a positive impact on knowledge sharing.

4.1.5 Conscientousness

Conscientious individuals can be defined as reliable, dependable, industrious, achievement oriented and organized (Cabrera et al., 2006). It is an important indicator of job performance as it is a reflection of personal characteristics such as such as persistent, planful, careful, responsible, and hardworking, which are important attributes for accomplishing work tasks in all jobs (Barrick & Mount, 1991). Conscientous individuals are unlikely to give up in difficult situations, which is in correlation of learning oriented individuals' persistence and increased efforts in challenging situations. People with low conscientiousness scores are unreliable and avoid taking significant responsibilities (Harris et al., 2005).

Conscientousness reflects reliability, and a willingness to get the tasks done regardless of their difficulty. It makes individuals inclined to participate in

knowledge sharing behavior, as gathering new knowledge is helpful for completing tasks successfully. Conscientious individuals would be open to learning new things and applying them.

Thus, we form the following hypotheses:

Hypothesis 7: Conscientousness has a positive impact on learning orientation.

Hypothesis 8: Conscientousness has a negative impact on performance orientation.

Hypothesis 9: Conscientousness has a positive impact on knowledge sharing.

4.1.6 Competitiveness

Competitiveness is a personality trait that involves the enjoyment of interpersonal competition and the desire to win and be better than others. It has a positive effect on performance, and learning effort shown by the individuals. Competitiveness also means that competitive employees try to outperform their colleagues and consequently fit in performance-oriented behavior (Matzler & Mueller, 2011).

We form the following hypotheses:

Hypothesis 10: Competitiveness has a positive impact on learning orientation.

Hypothesis 11: Competitiveness has a positive impact on performance orientation.

Hypothesis 12: Competitiveness has a positive impact on knowledge sharing.

4.1.7 Need for learning

Need for learning is positively related with learning orientation as if the individuals feel a need for learning, they are motivated to take actions to achive their learning orientation (Matzler & Mueller, 2011). As the need for learning leads one to enjoy learning new things and to enjoy working on new ideas, this trait negatively influences performance orientation (Harris et al., 2005).

Need for learning is the basic motivation that initiates learning process. Individuals that feel a need for learning will be more inclined to share knowledge with colleagues in order to create new knowledge and combine their individual knowledge with others'.

Thus, we form the following hypotheses:

Hypothesis 13: Need for learning have a positive impact on learning orientation.

Hypothesis 14: Need for learning have a negative impact on performance orientation.

Hypothesis 15: Need for learning have a positive impact on knowledge sharing.

4.1.8 Trust in peers

Propensity to trust is essentially a tendency to make attributions of people's actions in either an optimistic or a pessimistic fashion. This can be interpreted as a person with high trust assumes that most people are fair, honest and have good intentions whereas a person with low trust assumes that others are selfish and devious (Mooradian et al., 2006). Interpersonal trust in workplace defines as "the willingness of a party to be vulnerable to the actions of another party, with the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer et al., 1995).

In this context, trust is essential for stable social relationships. When individuals within an organization trust each other it is possible for them to achive a better coorperation performance. Trust makes exchange of knowledge easier and more effective, as it increases the tendency to put the new information in use. Trust in peers would reduce the amount of competitions among colleagues.

Thus, we form the following hypothesis:

Hypothesis 16: Trust in peers has a positive impact on knowledge sharing.

Hypothesis 17: Trust in peers has a positive impact on learning orientation.

Hypothesis 18: Trust in peers has a negative impact on performance orientation.

4.1.9 Knowledge self-efficacy

Knowledge self-efficacy implies that individuals believe that their knowledge can help to solve problems in workplace and improve the work performance. Employees who believe that they can contribute organizational performance by sharing knowledge is more likely to participate in knowledge sharing with colleguaes (Lin, 2007).

Individuals' belief and trust in their own knowledge is important for knowledge exchange. Employees with high confidence in their knowledge will be more likely to share their knowledge with others.

We hypothesize:

Hypothesis 19: Knowledge self-efficacy has a positive impact on knowledge sharing.

Hypothesis 20: Knowledge self-efficacy has a positive impact on learning orientation.

Hypothesis 21: Knowledge self-efficacy has a positive impact on performance orientation.

4.1.10 Shared vision

Shared vision reflects a a commonly accepted purpose and direction for the organization. When there is a lack of common direction, many creative ideas are never implemented. Great new ideas can't put into use because of diverse interests in the organization. Thus, a shared vision makes it easier to implement new knowledge and the creation process of said new knowledge (Calantone et al., 2001).

With a shared vision through the different levels and parts of a company, individuals are much more likely to share knowledge in order to create new ideas to serve the common purpose of the company. Having a shared vision makes employees focus on common goals and purposes instead of individual ones.

We hypothesize:

Hypothesis 22: Shared vision has a positive impact on knowledge sharing.

Hypothesis 23: Shared vision has a positive impact on learning orientation.

Hypothesis 24: Shared vision has a negative impact on performance orientation.

4.2 Research Model Design

Three models were designed in order to test 24 hypotheses proposed in this study. In the first model, relationship between firm innovation capability and knowledge sharing (Hypothesis 1) and relationship between knowledge sharing and its proposed determinants are investigated (Hypotheses 6, 9, 12, 15, 16, 19, 22). The variables and hypotheses of model I can be found in Figure 4.1.

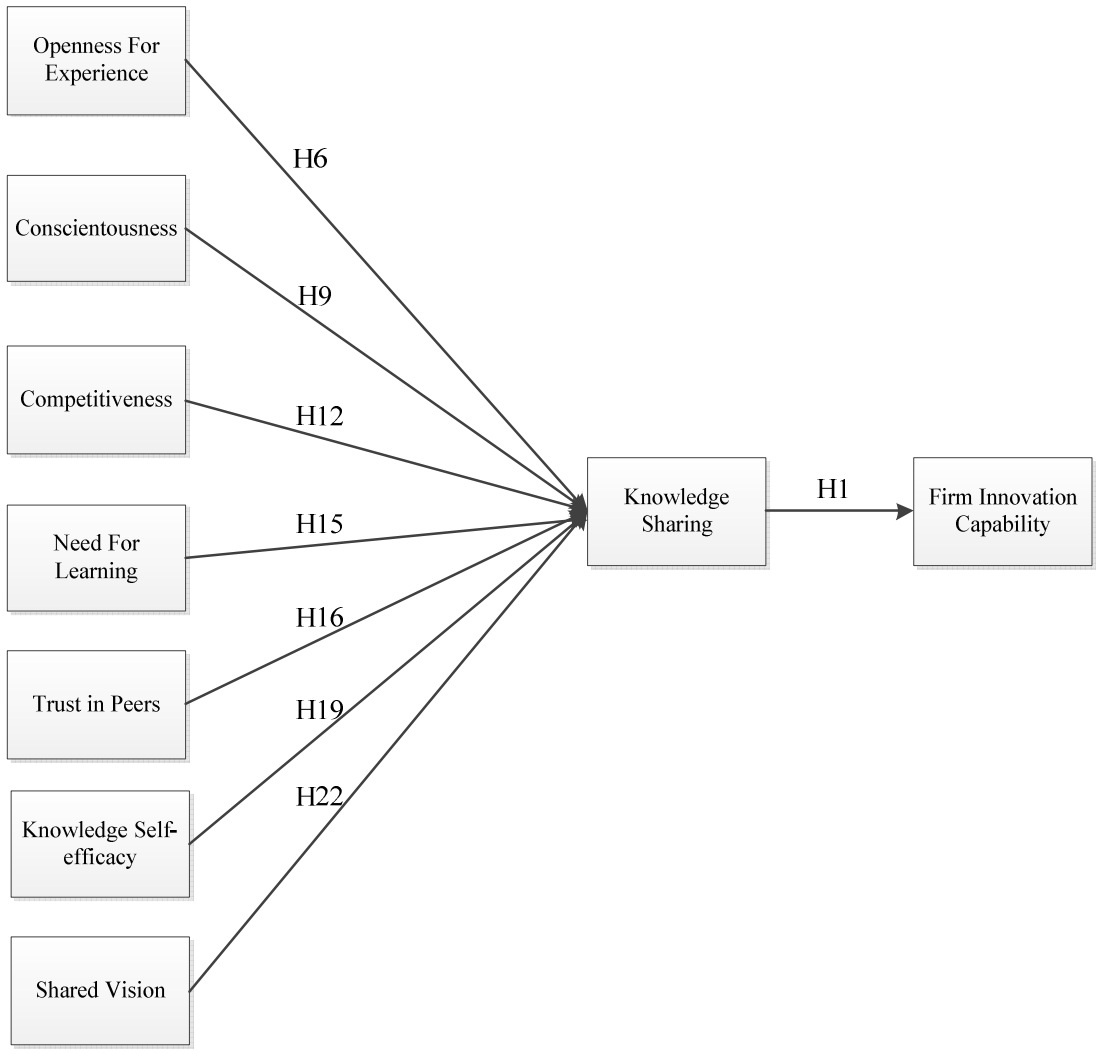


Figure 4.1 : Model I.

Model II includes the same relationship between firm innovation capability and knowledge sharing as model I (Hypothesis 1). The main difference from model I is two mediators for knowledge sharing, learning orientation and performance orientation (Hypotheses 2, 3). The proposed factors affecting knowledge sharing is now assesed by these variables, therefore the relationships between each variable and learning and performance orientation is investigated (Hypotheses 4, 5, 7, 8, 10, 11, 13, 14, 17, 18, 20, 21, 23, 24).

Model III is a combination of the first two models, designed based on the previous studies' results regarding the variables used. For this case there are two variables groups, one group that directly is in relationship with knowledge sharing (Hypotheses 16, 19, 22) and the other variable group that is in relationship with the mediators of knowledge sharing; performance and learning orientation (Hypotheses

4, 5, 7, 8, 10, 11, 13, 14). The relationships between knowledge sharing and firm innovation capability (Hypothesis 1) and between knowledge sharing and learning and perfomance orientations (Hypotheses 2,3) are also included in this model.

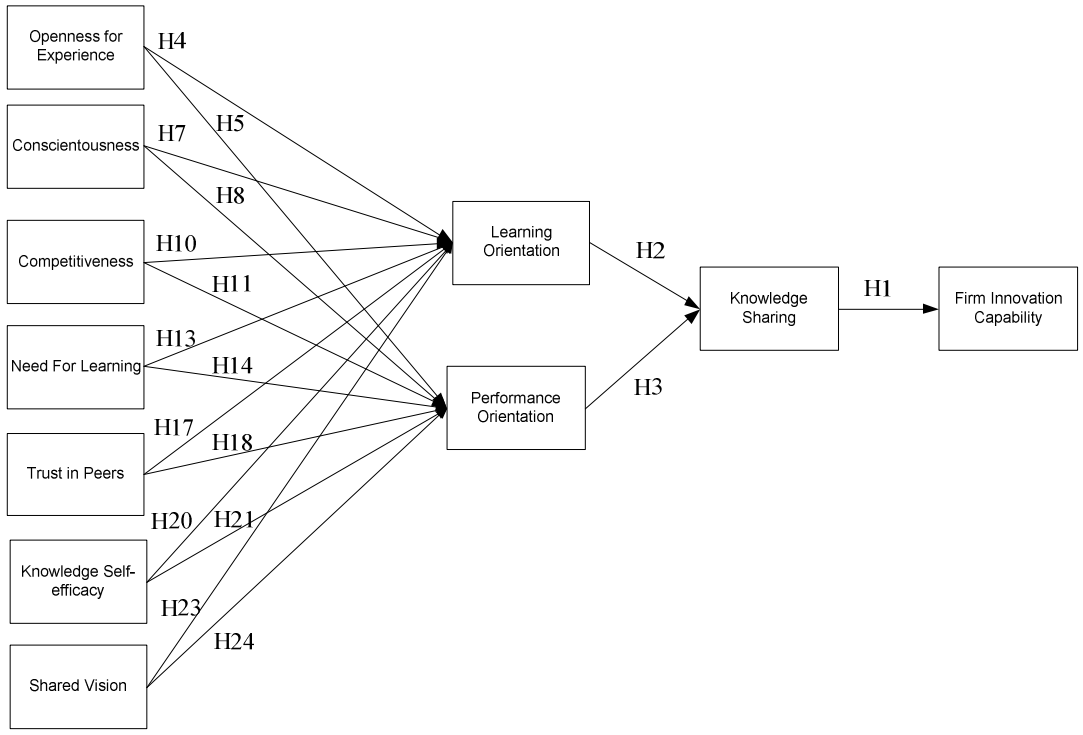


Figure 4.2 : Model II.

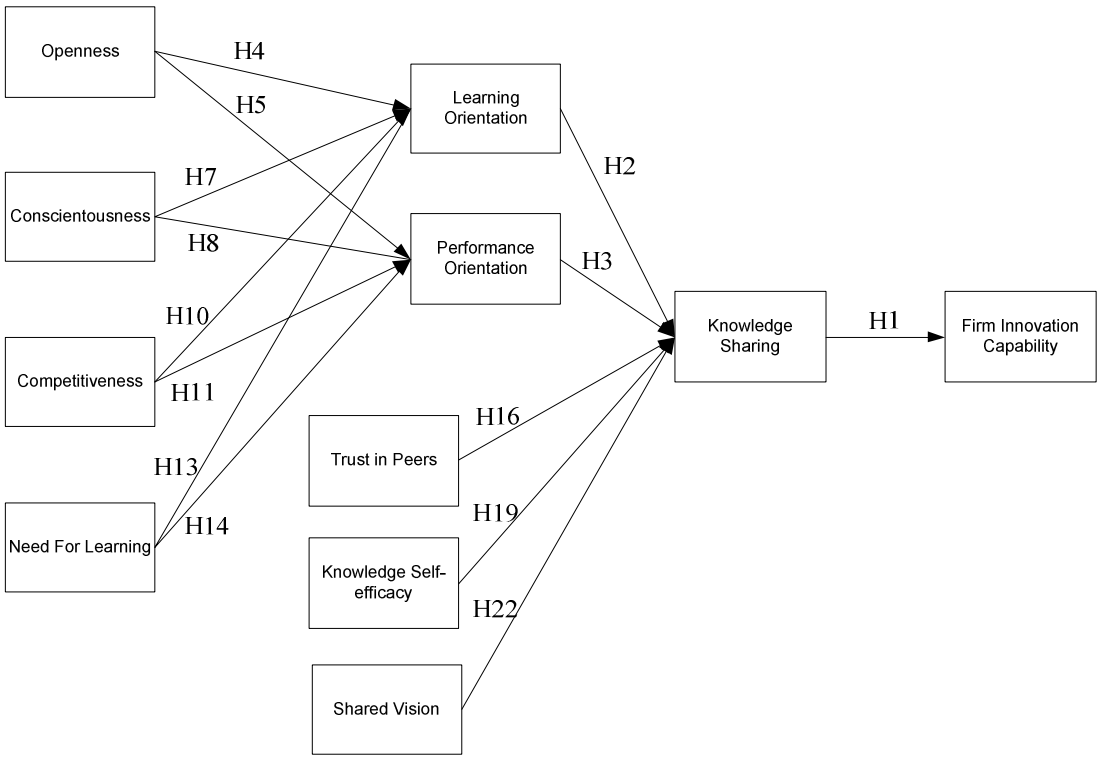


Figure 4.3 : Model III.

4.3 Methodology

In this study, survey method was used in order to gather data necessary to test the models. The questionnaire was designed in two parts. First part included demographic questions in order to analyze the sample group. Second part included a 43-item questionnaire based on the proposed models was formed as a measurement scale for the research. As the questionnaires from the literature were in English, the questionnaire was translated into Turkish in order to be able to get responses from subjects that does not speak English.

Demographic questions included personal information like age, gender, profession and education level along with work related information as the company's sector, the position in the company, the number of employees in the company and subjects' length of employment in their companies.

The second part of the questionnaire included 43 items selected from literature to measure the variables proposed in the model. All itens in the questionnaire were measured with a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Questions for each variable used in the survey are as follows; (R) representing a reverse coded question:

Openness for experience (Matzler & Mueller, 2011):

1. I often enjoy playing with theories and abstract ideas. (O1)
2. I have little interest in speculating on the nature of the universe or the human conditions. (R) (O2)
3. I find philosophical arguments boring. (O3)

Conscientousness (Matzler & Mueller, 2011):

1. I try to perform all the tasks assigned to me conscientiously. (CON1)
2. I have a clear set of goals and work toward them in an orderly fashion. (CON 2)
3. I work hard to accomplish my goals. (CON3)
4. When I make a commitment, I can always be counted onto follow through. (CON4)
5. I am a productive person who always gets the job done. (CON5)

Competitiveness (Mowen, 2000):

1. I enjoy competition more than others . (COM1)
2. I feel it is important to outperform others. (COM2)
3. I feel that winning is extremely important. (COM3)

Need for learning (Mowen, 2000):

1. I enjoy working on new ideas. (NL1)
2. Information is my most important resource. (NL2)

Trust in peers (Mooradian et al., 2006):

1. If I got into difficulties at work I know my colleagues would try and help me out. (T1)
2. I can trust the people I work with to lend me a hand if I needed it. (T2)
3. Most of my colleagues can be relied upon to do as they say they will do. (T3)

Knowledge self-efficacy (Spreitzer, 1995):

1. I am confident in my ability to provide knowledge that others in my company consider valuable. (SE1)
2. I have the expertise required to provide valuable knowledge for my company. (SE2)
3. It does not really make any difference whether I share my knowledge with colleagues. (R) (SE3)
4. Most other employees can provide more valuable knowledge than I can. (R) (SE4)

Shared vision (Calantone et al., 2002):

1. There is a commonality of purpose in my organization. (S1)
2. There is total agreement on our organizational vision across all levels, functions, and divisions. (S2)
3. All employees are committed to the goals of this organization. (S3)
4. Employees view themselves as partners in charting the direction of the organization. (S4)

Learning orientation (Kohli et al., 1998):

1. Making a tough project is very satisfying. (L1)
2. An important part of being a good employee is continually improving our skills. (L2)
3. I put in a great deal of effort sometimes in order to learn something new. (L3)

Performance orientation (Kohli et al., 1998):

1. I feel very good when I know I have outperformed other employees. (P1)
2. I always try to communicate my accomplishments to my manager. (P2)
3. I spend a lot of time thinking about how my performance compares with others. (P3)

Knowledge sharing (Van den Hooff & Van Weenen, 2004):

1. When I have learned something new, I tell my colleagues about it. (KS1)
2. When they have learned something new, my colleagues tell me about it. (KS2)
3. Knowledge sharing among colleagues is considered normal in my company. (KS3)
4. I share information I have with colleagues when they ask for it. (KS4)
5. I share my skills with colleagues when they ask for it. (KS5)
6. Colleagues in my company share knowledge with me when I ask them to. (KS6)
7. Colleagues in my company share their skills with me when I ask them to. (KS7)

Firm innovation capability (Calantone et al., 2002):

1. Our company frequently tries out new ideas. (IN1)
2. Our company seeks new ways of doing things. (IN2)
3. Our company is creative in its operating methods. (IN3)
4. Our company is frequently the first to market new products and services. (IN4)

5. Innovation is perceived as too risky in our company and is resisted. (R) (IN5)
6. Our new product introduction has increased during the last five years. (IN6)

4.4 Data Collection Procedure

The questionnaire was self administered. It was designed in two formats; online and print. Majority of the responses (84.2%) were collected through online questionnaire.

The questionnaire was sent to select companies from top 500 companies in Turkey, along with select SMEs, with an introductory cover explaning the subject and purpose of the study, along with instructions to complete it.

A total of 221 responses were collected between March and May 2012.

The questionnaire can be found in Appendix A.

5. RESULTS

In this section, the data analysis process is explained and the results are presented.

5.1 Demographic Statistics

Data were collected through a survey administered to 221 participants. Of these participants, 152 (68.8%) were male and 69 (31.2%) were female.

Ages of the participants ranged from 22 to 54, with the average of 28.96 and standard deviation of 6.819. The majoriy of the participants (62.4%) had university degrees, 30.3% had a master or PHD degree whereas 7.2% were graduated from high school.

Nearly half of the participants (48.9% in total) were from three industries; information technologies, automotive and food. They were followed by energy, finance and electronics industries. As this question had an open ended choice, 20.4% responded with industries that were not pre-determined.

The participants had an average length of 43.66 months (3.64 years) employment at their current companies. 11.8% of the participants were employed by companies with 0-50 employees, 33.0% were employed by companies with 51-250 employees and 55.2% were employed by companies with more than 250 employees.

Over the half of the participants (56.6%) hold a position as an engineer or specialist. 5.0% were top level managers, 17.2% were middle level managers, and 11.3% were technical personnel.

A summary of the charasteristics of the participants can be found in Table 5.1.

5.2 Data Analysis

The Statistical Package for the Social Sciences (SPSS Version 18.0) was the primary tool used for the statistical analysis of the data for this study. All of the regression analyses were conducted by using the regression analysis feature of SPSS.

Table 5.1 : Demographic Statistics of the participants.

Measure	Items	Frequency	Percentage
Gender	Female	69	31.2%
	Male	152	68.8%
Age	22-25	71	32.1%
	26-30	80	36.2%
	31-35	24	10.9%
	36-40	22	10.0%
	41-45	11	5.0%
	46-50	7	3.2%
	51-54	6	2.7%
Education	High School	16	7.2%
	University	138	62.4%
	Master/PHD	67	30.3%
Industry	Information Technologies	38	17.2%
	Automotive	38	17.2%
	Food	32	14.5%
	Chemistry	8	3.6%
	Construction	8	3.6%
	Machine Manufacturing	8	3.6%
	Electronics	10	4.5%
	Fincance and Banking	12	5.4%
	Communication	2	0.9%
	Energy	20	9.0%
	Others	45	20.4%
Length of Employment in Current Company (months)	0-24	111	50.2%
	25-60	61	27.6%
	61-120	22	10.0%
	121-240	19	8.6%
	240+	8	3.6%
Number of Employees	0-50	26	11.8%
	51-250	73	33.0%
	250+	112	55.2%
Position	Top Level Manager	11	5.0%
	Middle Level Manager	38	17.2%
	Engineer/Specialist	125	56.6%
	Technical Personnel	25	11.3%
	Others	22	10.0%

Table 5.2 : Statistical summary of the variables.

Variable	Mean	Std. Dev.	Skewness	Kurtosis
CON1	4.66	0.644	-2.539	9.291
CON2	3.66	1.034	-0.562	-0.041
CON3	4.04	0.819	-0.484	-0.378
CON4	4.49	0.663	-1.143	0.985
CON5	4.23	0.781	-0.913	0.639
NL1	4.19	0.844	-0.744	-0.227
NL2	4.55	0.675	-1.749	3.747
COM1	3.02	1.102	-0.165	-0.517
COM2	3.54	1.054	-0.246	-0.392
COM3	3.67	1.111	-0.598	-0.280
O1	4.38	0.806	-1.348	2.056
O2	4.01	1.028	-0.651	-0.571
O3	3.57	1.178	-0.268	-0.946
T1	3.80	0.794	-0.529	0.100
T2	3.89	0.846	-0.538	0.323
T3	3.76	0.863	-0.753	0.917
S1	3.90	0.937	-0.698	0.363
S2	3.26	0.879	-0.115	-0.231
S3	3.39	0.965	-0.346	-0.331
S4	3.25	1.006	-0.354	-0.499
SE1	4.17	0.755	-0.420	-0.701
SE2	3.87	0.821	-0.373	-0.318
SE3	3.37	1.316	-0.465	-0.966
SE4	3.23	0.982	-0.422	-0.213
L1	4.68	0.653	-2.628	9.254
L2	4.44	0.812	-1.921	4.895
L3	4.14	0.848	-1.021	1.244
P1	3.60	1.152	-0.516	-0.468
P2	4.20	0.945	-1.166	1.134
P3	2.89	1.122	0.101	-0.685
KS1	4.07	0.805	-0.792	0.499
KS2	3.55	0.901	-0.141	-0.716
KS3	4.18	0.771	-0.564	-0.343
KS4	4.47	0.648	-1.050	0.965
KS5	4.22	0.789	-1.000	0.934
KS6	4.04	0.772	-0.684	0.478
KS7	3.84	0.775	-0.331	-0.155
IN1	3.41	1.077	-0.145	-0.628
IN2	3.61	1.012	-0.530	-0.204
IN3	3.25	1.051	-0.323	-0.370
IN4	3.46	1.089	-0.213	-0.643
IN5	3.74	1.179	-0.665	-0.381
IN6	4.00	1.014	-1.151	1.198

Reliablity is an assessment of the degree of the consistency between multiple measurements of a variable. Cronbach's alpha is the most widely used measure of on reliability, and it was used in this studyto measure the reliability of all items. Minimum accepted reliability of Cronbach's alpha ranges from 0.60 to 0.70 in literature.

All of the variables have reliability over 0.6 except knowledge self-efficacy. Upon further analysis it was decided to eliminate 2 items for this variable in order to improve the reliability of the variable. By eliminating two of the items of this variable, the Cronbach's alpha value was increased to 0.667. Thus, for the remainder of the analysis SE3 and SE4 won't be taken into account. Cronbach's alpha values for all variables can be found in Table 5.2.

Table 5.3 : Reliability of items using Cronbach's Alpha.

Item	α
Openness to experience	0.626
Conscientousness	0.803
Competitiveness	0.763
Need for learning	0.622
Trust in peers	0.783
Knowledge self-efficacy	0.667
Shared Vision	0.773
Learning Orientation	0.712
Performance Orientation	0.788
Knowledge Sharing	0.846
Firm Innovation Capability	0.821

In order to determine the relationship between variables and explain and test the hypotheses proposed regression analyses were conducted for the proposed models.

5.2.1 Analysis for model I

In the first analysis, relationship between firm innovation capability and knowledge sharing was investigated. According to the Hypothesis 1, which is included in all three models, knowledge sharing has a positive impact on firm innovation capability.

In order to determine the relationship levels between firm innovation capability and knowledge sharing, stepwise regression analysis was conducted. Firm innovation capability was independent variable for the analysis, whereas knowledge sharing was the dependent variable. Results are presented in Table 5.4, 5.5 and 5.6.

Table 5.4 : Regression analysis on firm innovation capability.

Independent Variable	Dependent Variable	R^2	Adjusted R^2	Std. Error
Firm Innovation Capability	Knowledge Sharing	0.106	0.097	0.7394

R^2 value indicates the percentage of total variation of the independent variable explained by the regression model consisting the independent variables. In this case, R^2 is equal to 0.106. This implies that 10.6% of firm innovation capability can be explained by knowledge sharing.

Table 5.5 : ANOVA on firm innovation capability.

	Sum of Squares	dF	Mean Square	F	Sig.
Regression	6.853	1	6.853	12.536	0.001
Residual	57.950	219	0.547		
Total	64.803	220			

The ANOVA analysis provies the statistical test for the overall model fit in terms of the *F* ratio. The analysis show that the the model is statistically significant in explaining firm innovation capability with an *F* ratio of 12.536 and a significance level of 0.001.

Table 5.6 : Coefficients of firm innovation capability.

	B	Std. Error.	Beta	t	Sig.
(Constant)	1.762	0.518		3.401	0.001
Knowledge Sharing	0.448	0.127	0.325	3.541	0.001

The regression coefficient b and the standardized coefficient β reflect the change in the dependent measure for each unit change in independent variable. The beta values enables us to compare the effect of dependent variables on the independent variables. The t value of variables in the equation measures the significance of the partial correlation of the variable reflected in the regression coefficient. As such, it indicates whether we can say that the coefficient is not equal to zero. In this analysis, the t value is 3.541, which is statistically significant at the 0.001 level. It implies that the coefficient is not equal to zero and can be assessed as a predictor of firm innovation capability.

The results for the regression analysis on firm innovation capability show that knowledge sharing has a positive impact on firm innovation capability therefore Hypothesis 1 is confirmed.

Next, the hypotheses related to factors affecting knowledge sharing in model 1 are analyzed. The results can be found in Table 5.7, 5.8 and 5.9.

Table 5.7 : Regression analysis on knowledge sharing for model I.

Independent Variable	Dependent Variables	R^2	Adjusted R^2	Std. Error
Knowledge Sharing	Trust in Peers Conscientiousness Competitiveness	0.621	0.610	0.3524

Results show that trust in peers, conscientiousness and competitiveness have an impact on knowledge sharing. R^2 value is 0.621 for this analysis, which implies that the dependent variables successfully explain the independent variable.

Table 5.8 : ANOVA on knowledge sharing for model I.

	Sum of Squares	dF	Mean Square	F	Sig.
Regression	21.188	3	7.063	56.862	0.000
Residual	12.918	217	0.124		
Total	34.106	220			

ANOVA analysis show that the the model is statistically significant in explaining knowledge sharing with an *F* ratio of 56.862 and a significance level of 0.000.

Table 5.9 : Coefficients of knowledge sharing for model I.

	B	Std. Error.	Beta	t	Sig.
(Constant)	1.163	0.304		3.828	0.000
Trust in peers	0.492	0.050	0.608	9.771	0.000
Conscientiousness	0.351	0.060	0.372	5.860	0.000
Competitiveness	-0.137	0.040	-0.217	-3.426	0.001

We can see from the results that trust in peers and conscientiousness have a positive impact on knowledge sharing, whereas competitiveness has a negative effect. Beta values for the variables show that one unit increase in trust in peers would result in a 0.608 increase in knowledge sharing, one unit increase in conscientiousness would result in a 0.372 unit increase in knowledge sharing and one unit increase in competitiveness would decresse knowledge sharing 0.217 units.

The results of regression analysis on knowledge sharing show that Hypotheses 9 and 16 were confirmed for model I, while Hypotheses 6, 12, 15, 19 and 22 were not supported by the analyses. A graphical summaryof the findings is presented in Figure 5.1.

5.2.2 Analysis for model II

For model II, analysis and results for the relationship between knowledge sharing and firm innovation capability will not be repeated as the results from the analysis done for model I will be the same.

In model II, there are two mediators between the variables used in model I and knowledge sharing variable, learning and performance orientation. First, the relationship between learning and performance orientations and knowledge sharing will be analyzed. Then the regression analysis will be conducted for the proposed determinants of learning and performance orientation.

The first analysis is related to Hypotheses 2 and 3, and will determine whether goal orientations have an impact on knowledge sharing behavior. Results of the regression analysis conducted can be found in Table 5.10, 5.11 and 5.12.

Results show that both variables tested in the analysis have an impact on knowledge sharing. R^2 value is 0.148 for this analysis, which is relatively low but significant according to the results.

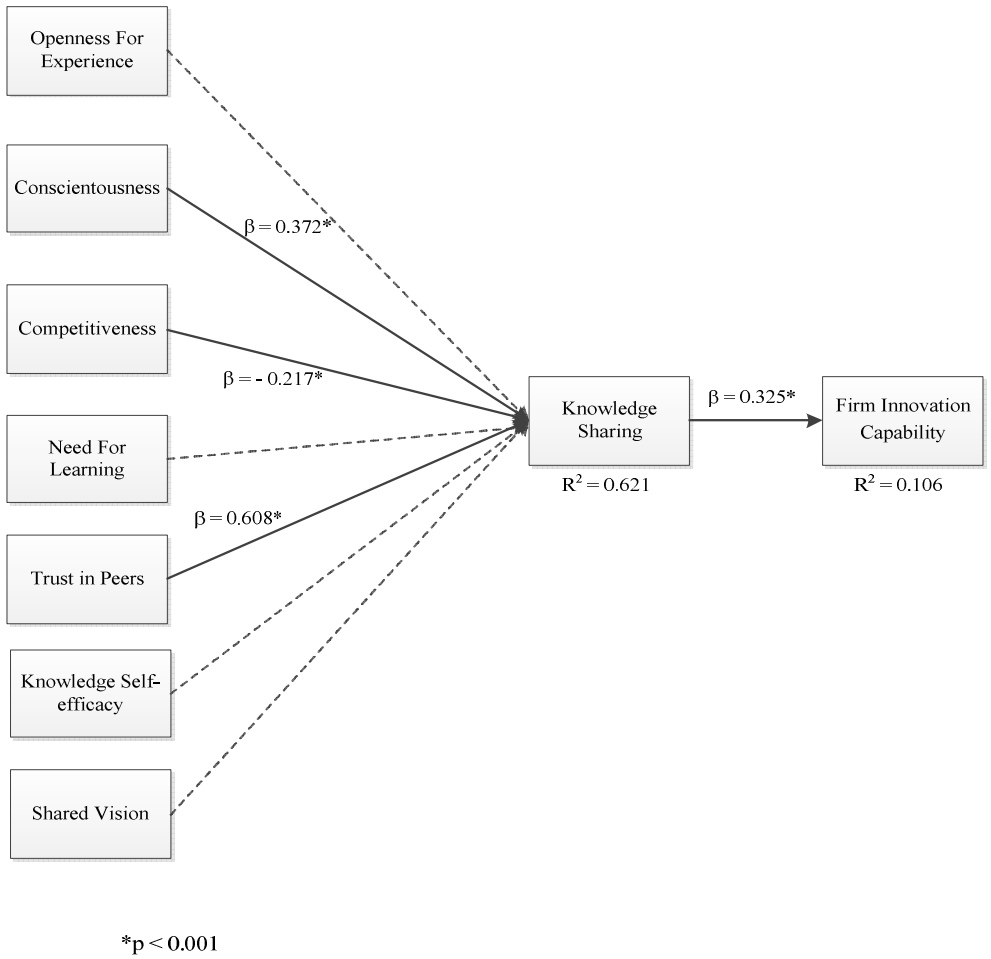


Figure 5.1 : Results for analysis of Model I.

Table 5.10 : Regression analysis on knowledge sharing for model II.

Independent Variable	Dependent Variables	R^2	Adjusted R^2	Std. Error
Knowledge Sharing	Learning Orientation Performance Orientation	0.148	0.132	0.5260

Table 5.11 : ANOVA on knowledge sharing for model II.

	Sum of Squares	dF	Mean Square	F	Sig.
Regression	5.050	2	2.525	9.125	0.000
Residual	29.056	218	0.277		
Total	34.106	220			

ANOVA analysis show that the the model is statistically significant in explaining knowledge sharing with an *F* ratio of 9.125 and a significance level of 0.000.

Table 5.12 : Coefficients of knowledge sharing for model II.

	B	Std. Error.	Beta	t	Sig.
(Constant)	2.859	0.402		7.109	0.000
Learning Orientation	0.374	0.091	0.386	4.225	0.000
Performance Orientation	-0.129	0.059	-0.205	-2.189	0.031

We can see from the results that while learning orientation has a positive impact on knowledge sharing, performance orientation has a negative effect. Beta value for learning orientation is 0.386, and beta value for performance orientation is -0.205. These results confirm Hypotheses 2 and 3, regarding the relationship between goal orientations and knowledge sharing.

Next analysis set for model II is conducted on the determinants of learning and performance orientation. Each of these variables are taken as the independent variables for 2 separate analysis, in which 7 variables used to explain knowledge sharing in model 1 were dependent variables.

The results of regression analysis on learning orientation are presented in Table 5.13, 5.14 and 5.15. The results of regression analysis on performance orientation are presented in Table 5.16, 5.17 and 5.18.

Table 5.13 : Regression analysis on learning orientation.

Independent Variable	Dependent Variables	R^2	Adjusted R^2	Std. Error
Learning Orientation	Conscientiousness Need for Learning	0.529	0.520	0.4031

Results show that of the 7 dependent variables tested, conscientiousness and need for learning have an impact on learing orientation. R^2 value is 0.529, which implies that the dependent variables successfully explain the independent variable.

Table 5.14 : ANOVA on learning orientation.

	Sum of Squares	dF	Mean Square	F	Sig.
Regression	19.186	2	9.593	59.031	0.000
Residual	17.064	218	0.163		
Total	36.250	220			

ANOVA analysis show that the the model is statistically significant in explaining learning orientation with an *F* ratio of 59.031 and a significance level of 0.000.

Table 5.15 : Coefficients of learning orientation.

	B	Std. Error.	Beta	t	Sig.
(Constant)	1.063	0.321		3.309	0.001
Conscientiousness	0.580	0.073	0.596	7.907	0.000
Need for Learning	0.208	0.070	0.225	2.981	0.004

The results show that conscientiousness and need for learning has a positive impact on learning orientation. Thus, Hypotheses 7 and 13 were confirmed, whereas Hypotheses 4, 10, 17, 20 and 23 were not supported.

Table 5.16 : Regression analysis on performance orientation.

Independent Variable	Dependent Variables	R^2	Adjusted R^2	Std. Error
Performance Orientation	Competitiveness	0.538	0.533	0.6121

Results show that of the 7 dependent variables tested, only competitiveness have an impact on learing orientation. R^2 value is 0.538, which implies that the dependent variables successfully explain the independent variable.

Table 5.17 : ANOVA on performance orientation.

	Sum of Squares	dF	Mean Square	F	Sig.
Regression	46.166	1	46.166	123.220	0.000
Residual	39.714	219	0.375		
Total	85.880	220			

ANOVA analysis show that the the model is statistically significant in explaining learning orientation with an *F* ratio of 123.220 and a significance level of 0.000.

Table 5.18 : Coefficients of performance orientation.

	B	Std. Error.	Beta	t	Sig.
(Constant)	1.069	0.232		4.602	0.000
Competitiveness	0.732	0.066	0.733	11.102	0.000

The results show that competitveness have a positive impact on performance orientation. These results confirm Hypothesis 11, whereas Hypotheses 5, 8, 14, 18, 21 and 24 were not supported.

Graphical representation of the findings can be found in Figure 5.2.

5.2.3 Analysis for model III

For model III, analysis and results for the relationship between knowledge sharing and firm innovation capability will not be repeated as the results from the analysis done for model I will be the same.

In model III, first two models were combined based on the findings from previous studies in the literatures. First, another regression analysis is applied to knowledge sharing, using learning orientation, performance orientation, trust in peers, shared vision and knowledge self-efficacy. It should be noted that separate analyses won't be necessary are for learning and performance orientations with the dependent variables openness for experience, conscientiousness, competitiveness and need for learning.

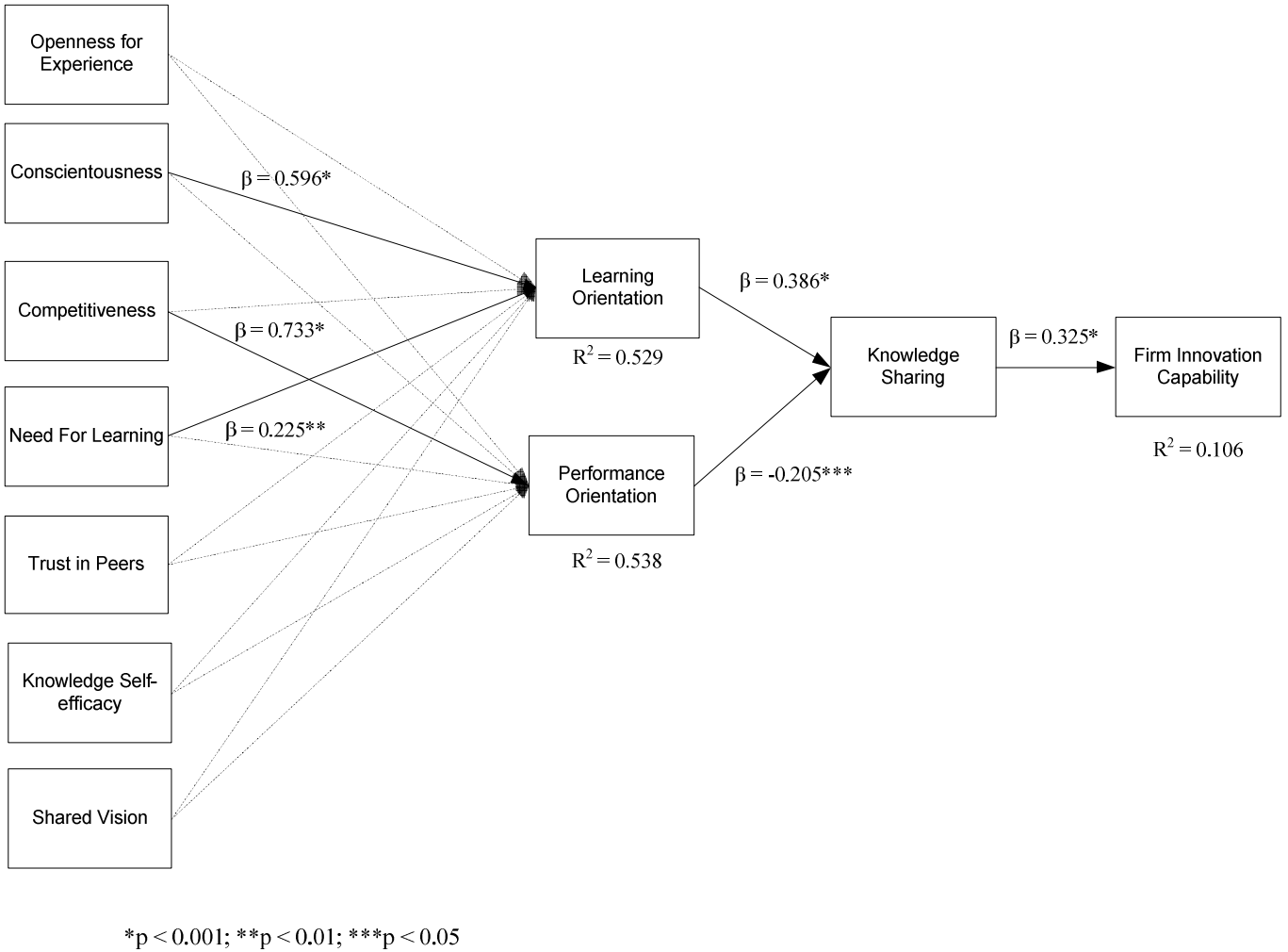


Figure 5.2 : Results for analysis of Model II.

Results of the analysis for model II showed that the three variables altered for this model did not had any impact on learning and performance orientation, thus their exclusion from the analysis will yield the same results. Because of this reason, only regression analysis on knowledge sharing was conducted.

The regression analysis for model III is related to Hypotheses 2, 3, 16, 17 and 18. It is important to note that while Hypotheses 2, 3 and 16 were supported by earlier analyses; those analyses were based on a different model structure. The results of the analysis are presented in Table 5.19, 5.20 and 5.21.

Table 5.19 : Regression analysis on knowledge sharing for model III.

Independent Variable	Dependent Variables	R^2	Adjusted R^2	Std. Error
Knowledge Sharing	Trust in Peers Learning Orientation	0.534	0.525	0.3891

Results show that trust in peers and learning orientation has an impact on knowledge sharing. R^2 value is 0.534 for this analysis.

Table 5.20 : ANOVA on knowledge sharing for model III.

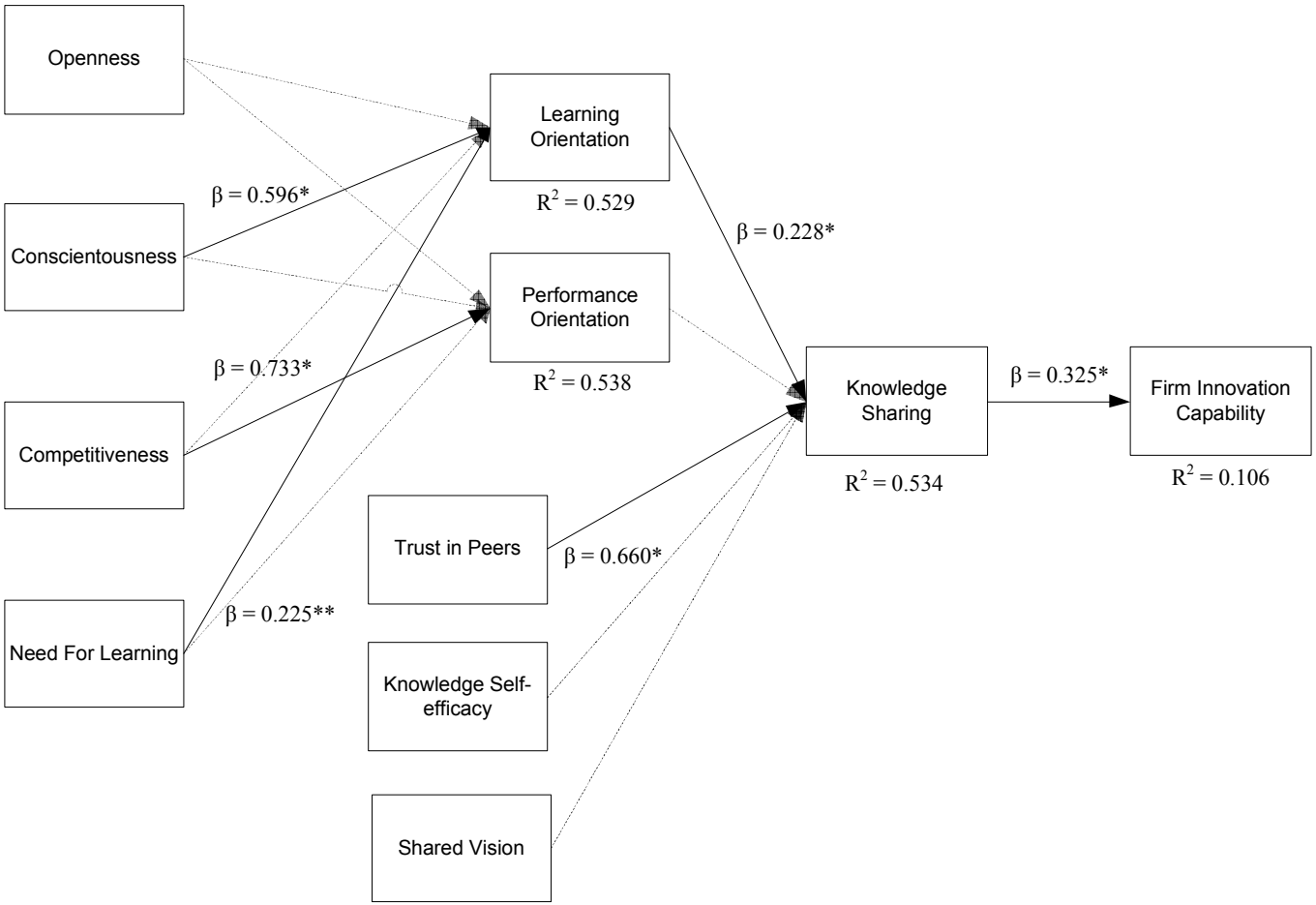
	Sum of Squares	dF	Mean Square	F	Sig.
Regression	18.205	2	9.102	60.105	0.000
Residual	15.901	218	0.151		
Total	34.106	220			

ANOVA analysis show that the the model is statistically significant in explaining knowledge sharing with an *F* ratio of 60.105 and a significance level of 0.000.

Table 5.21 : Coefficients of knowledge sharing for model III.

	B	Std. Error.	Beta	t	Sig.
(Constant)	1.042	0.331		3.147	0.002
Trust in peers	0.534	0.055	0.660	9.778	0.000
Learning Orientation	0.221	0.065	0.228	3.373	0.001

We can see from the results that trust in peers and learning orientation have a positive impact on knowledge sharing. Thus, Hypotheses 2 and 16 were supported, while 3, 17 amd 18 were rejected. It can be seen that Hypothesis 3 was not supported by this model, as there were no relationship found between performance orientation and knowledge sharing, even though it was supported by the analysis regarding model II. A graphical representation of the findings can be found in Figure 5.3.



*p < 0.001; **p < 0.01

Figure 5.3 : Results for analysis of Model III.

6. DISCUSSION AND CONCLUSION

In today's highly competitive world, innovations give the companies edge against their competitions. This makes it an important area of research for academics and companies alike. Knowledge sharing is one of the initiators of new knowledge creation; in other words new ideas, products, processes and systems. Innovations can only be made in organizations with a strong awareness of the importance of knowledge management. An environment that supports and motivates knowledge sharing increases the innovation performance of organizations.

In this study, three models were designed based on 24 differeny hypothesis regarding factors affecting knowledge sharing and firm innovation capability. Then these models were empirically tested by developing a survey to measure the contstructs. A 43-item questionnaire measuring 11 variables was applied to 221 participats. The gathered data then were analyzed statistically by using regression analysis.

A positive relationship between firm innovation capability and knowledge sharing was found, which is in line with many previous studies from the literature. The strength of the relationship was lower than similar studies, which could be explained by the differences in perception of concepts like innovation and knowledge between sample groups. The validity of this relationship strengthens the commonly accepted view of knowledge sharing as a determinant of innovation.

The effects of goal orientation on knowledge sharing were also analyzed. The results supports hypotheses developed; learning orientation has a positive impact on knowledge sharing, while performance orientation has a negative effect. These findings are also in accordance with previous studies.

Results for analyses regarding factors affecting knowledge sharing supported 3 of 7 hypotheses proposed, as it was shown that only trust in peers, conscientiousness and competitiveness have an impact on knowledge sharing behavior.

Factors affecting learning orientation and performance orientation were also investigated in two separate models. It was shown that need for learning and

conscientiousness have positive impact on learning orientation; and competitiveness has a positive impact on performance orientation.

Although most of the results are in accordance with the previous studies from literature, it is important to note that there are also some differences.

From a managerial point of view the most important implication of this study is that organizations should create a knowledge sharing environment to improve their innovation capabilities. Apart from personal traits like conscientiousness and goal orientations there are also factors like trust in peers and shared vision, which could be developed and improved by the companies. This study shows the importance of proper knowledge management, and the need to improve knowledge sharing across all levels of the organization.

It is worth noting that this study was conducted in Turkey, which is still categorized as a developing country. Innovation and knowledge management concepts are relatively new to the employees and companies in Turkey than their counterparts in developed countries. This could create a difficulty while comparing results of studies from different countries with different levels of social development. This also reflects one of the limitations of this study, as the participants of the survey were selected from a single country.

Another limitation of the study is the dependency on the data gathered by survey method. Even though there are many studies support using this type of self-administered survey, it is possible that the responses could be subjective upon the personal and environmental factors of the time the survey was completed by the participants.

Even though a high number of antecedent factors are included in models and hypotheses, it is still a limited number. There are many other proposed factors in the literature that influences knowledge sharing and innovation capability. This is an important implication for future research as the models could be altered or expended with different variables.

Another implication would be comparing participants from different demographics, such as gender, experience, education level and position. It is possible for parameters like experience and position to affect knowledge sharing behavior within the

organizations. Also, the characteristics of the companies also could alter propositions of this study, such as size, revenue, and industry.

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APPENDICES

APPENDIX A: Survey

APPENDIX A

İstanbul Teknik Üniversitesi

İşletme Fakültesi

Endüstri Mühendisliği Bölümü

Sayın İlgili;

Bu anket, çalışanların kişisel özelliklerinin organizasyonel bilgi paylaşımı ve inovasyon performansı üzerine etkilerini araştıracağımız çalışmada temel veri kaynağımızı teşkil edecektir. Anketteki tüm soruların eksiksiz bir şekilde cevaplanması çalışmamızın verimliliği açısından çok önemlidir. Toplanacak tüm bilgiler gizli tutulacak, bireylerle ilgili hiçbir veri paylaşıma açılmayacaktır.

İlgili alanda belirtmeniz durumunda çalışmamız sonucunda elde edilen bulguları sizinle paylaşmaktan mutluluk duyacağız. Çalışmamıza gösterdiğiniz ilgi ve yardımınız için çok teşekkür ederiz.

Saygılarımızla,

Prof. Dr. Ramazan EVREN
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I. Demografik özellikler (Lütfen ilgili kutucukları doldurunuz.)

Cinsiyet: Kadın ☐
Erkek ☐

Yaş : _____ Meslek : _____

Çalıştığınız Sektör :

Bilgi Teknolojileri ☐	Otomotiv ☐
Demir –Çelik ☐	Kimya ☐
Hizmet ☐	Metalurji ☐
Gıda ☐	İnşaat ☐
Tekstil ☐	Makine İmalat ☐
Cam ☐	Kağıt ve Kağıt Ürünleri ☐
Dağıtım ☐	Sağlık ☐
Elektronik ☐	Bankacılık ve Finans ☐
Ulaşım ☐	Maden ☐
Telekomünikasyon ☐	Turizm ☐
Enerji ☐	Diğer ☐

(Lütfen belirtiniz):

_____

Şu anda çalıştığınız şirkette ne kadar süredir çalışmaktasınız? _____ yıl _____ ay

Pozisyon	Üst düzey yönetici	☐
	Orta düzey yönetici	☐
	Uzman / Mühendis	☐
	Teknik personel	☐
	Diğer :_____	
Eğitim Seviyesi	Lise	☐
	Lisans	☐
	Yüksek lisans/Doktora	☐
Çalışan Sayısı	≤ 50	☐
	51-250	☐
	≥ 250	☐

II. Aşağıdaki cümlelere katılım derecenizi belirtiniz
(Sorulara vereceğiniz cevaplarda "1: kesinlikle katılmıyorum" ve "5: kesinlikle katılıyorum" anlamına gelmektedir. Bu aralıkta işaretleyeceğiniz sayılar hangi noktaya daha yakın olduğunuzu temsil etmektedir.)

SORULAR	**1**	**2**	**3**	**4**	**5**
1. Teori ve fikir oluşturmaktan hoşlanırım					
2. Diğer çalışanlara göre rekabetten daha çok hoşlanırım					
3. Şirketimde çalışan diğer kişilerin değerli bulacağı bilgileri sağlayabilme konusunda kendime güvenirim					
4. Bana verilen tüm görevleri sorumlu bir şekilde yerine getirmeye çalışırım					
5. Zor bir işi tamamlamak tatmin edicidir					
6. Diğer çalışanların performanslarını geçtiğimde kendimi çok iyi hissederim					
7. Bulunduğum işletme sürekli olarak yeni fikirler dener					
8. Yeni bir bilgi edindiğimde bunu iş arkadaşlarımla paylaşırım					
9. İyi bir çalışan olmanın önemli bir parçası, sahip olunan yeteneklerin sürekli geliştirilmesidir					
10. Başardığım şeyleri yöneticimin de bilmesini isterim					
11. Diğer çalışanların performansından daha iyi bir performans göstermenin önemli olduğuna inanırım					
12. Evren ve insan yaşamıyla ilgili konulara olan ilgim azdır					
13. Net hedefler belirleyerek onlara ulaşmak için düzenli bir şekilde çalışırım					
14. Şirketim açısından değerli olabilecek bilgiler sağlayabilmem için gerekli uzmanlığa sahibim					
15. Sahip olduğum bilgileri istedikleri taktirde iş arkadaşlarımla paylaşırım					
16. Bulunduğum işletme, işleri yapmanın yeni yollarını arar					
17. Benim için kazanmak çok önemlidir					
18. Felsefi tartışmaları sıkıcı bulurum					
19. Yeni bir şey öğrenmek için zaman zaman büyük çaba harcarım					
20. Sık sık performansımın diğer çalışanların performansıyla karşılaştırmasını yaparım					
21. Bulunduğum işletme çalışma yöntemlerinde yaratıcılık gösterir					
22. Sahip olduğum yetenekleri sordukları taktirde, iş arkadaşlarımla paylaşırım					
23. Hedeflerime ulaşabilmek için çok çalışırım					
24. Sahip olduğum bilgileri iş arkadaşlarımla paylaşmam bir fark yaratmaz					
25. Bulunduğum organizasyonda ortak bir amaç vardır					
26. Çalıştığım kişilere ihtiyacım olduğu zaman, bana yardım edecekleri konusunda güvenirim					
27. Çalışanlar kendilerini organizasyonun yönünün belirlenmesi sürecine dahil görmektedirler					

SORULAR	1	2	3	4	5
28. Her zaman, yapması gereken işi tamamlayan üretken bir insanımdır					
29. Diğer çalışanların çoğu benim sağlayabileceğim bilgilerden daha değerli bilgilere sahiptir					
30. İş arkadaşlarım sahip oldukları yetenekleri sorduğum taktirde benimle paylaşır					
31. Bilgi benim en önemli kaynağımdır					
32. Bulunduğum işletme sık sık yeni ürünleri ve hizmetleri piyasaya sunar					
33. İş arkadaşlarımın çoğunluğu yapacaklarını söyledikleri şeyleri yapma konusunda güvenilirdirler					
34. Organizasyonel vizyonumuz konusunda tüm seviye ve bölümlerdeki çalışanlar hemfikirdir					
35. Bir söz verdiğimde sözümü tutacağıma inanılır					
36. İş arkadaşlarım sahip oldukları bilgileri sorduğum taktirde benimle paylaşırlar					
37. Bulunduğum işletmede inovasyonun riskli olduğuna inanılır ve inovasyona karşı direnç gösterilir					
38. Eğer işimle alakalı zorluklar yaşarsam, iş arkadaşlarım bana yardımcı olmak için çalışırlar					
39. Piyasaya sunduğumuz yeni ürün sayısı son beş yıl içerisinde artmıştır					
40. Çalışanlar arasında bilgi paylaşımı, bulunduğum şirkette olağan karşılanır					
41. Tüm çalışanlar organizasyonun sahip olduğu hedefleri benimsemektedirler					
42. İş arkadaşlarım yeni bir bilgi edindiğinde bunu benimle paylaşırlar					
43. Yeni fikirler üzerine çalışmaktan hoşlanırım					

İlgi gösterdiğiniz ve zaman ayırdığınız için çok teşekkür ederiz.

Anket çalışmamızın sonuçlarını sizinle paylaşmamızı ister misiniz? ☐ **Evet** ☐ **Hayır**

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