A STUDY ON KNOWLEDGE SHARING PRACTICES AND INNOVATION CAPABILITY: A SOCIAL CAPITAL PERSPECTIVE

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ABSTRAK

Objektif kajian ini adalah bertujuan untuk melihat pengaruh komoditi modal sosial terhadap amalan perkongsian pengetahuan dan inovasi terhadap organisasi berasaskan pengetahuan. Kajian terdahulu yang berdasarkan teori berasaskan sumber (RBT) atau teori berdasarkan pengetahuan(KBT) mendapati faktor organisasi adalah bertindak sebagai pemangkin atau pencetus perkongsian pengetahuan dan seterusnya membentuk inovasi dalam organisasi. Walaubagaimanapun, kajian yang telah dibuat tidak memperlihatkan kebarangkalian moderator komoditi modal sosial dalam perkaitan hubungan dua angkubah yang terlibat. Oleh yang demikian, kajian ini ingin melihat permasalahan ini dan menilai peranan modal sosial. Model Integrasi di cadangkan dalam kajian ini dengan menilai pengaruh 'moderator' modal sosial terhadap faktor organisasi seperti teknologi maklumat, budaya inovasi, struktur organisasi, sistem penghargaan dan sokongan pihak pengurusan dalam perkongsian pengetahuan dan inovasi kepada organisasi. Kajian data kuantitatif telah dijalankan terhadap 167 organisasi yang berteraskan pengetahuan. Kajian ini menggunakan model pengstrukturan (SEM) untuk mengesahkan integrasi model dengan menggunakan perisian PLS-SEM. Dapatan kajian mengesahkan kebanyakan factor organisasi gagal mempengaruhi perkongsian pengetahuan seperti yang dilaporkan dalam kajian-kajian yang lepas. Walaubagaimanapun, apabila faktor demografik seperti umur responden dan populasi industry disertakan dalam analisa data, hubungan yang digariskan dalam kajian dapat disokong. Pengaruh "moderator" modal sosial turut disokong menerusi dua cara: pertama, pekali yang signifikan (t-value) untuk interaksi dengan struktur organisasi dan sokongan pengurusan hanya dikenalpasti di dalam konteks firma kewangan manakala kesan "moderator" modal sosial ("shared language') dikenalpasti

untuk keseluruhan sampel kajian. Kedua, kesan "moderator" juga dikenalpasti menerusi perubahan signifikan dalam nilai R^2 model apabila interaksi antara pembolehubah dan "moderator" disertakan dalam model kajian.

ABSTRACT

The main aim of this study is to investigate the influence of social capital of communities of practice on knowledge-sharing practices and innovation among Iranian knowledge-intensive industries; that is, financial and pharmaceutical industries. Numerous past studies centred on the resource-based theory of the firm, or the knowledge-based view of the firm, identified organizational factors that may serve as enablers or inhibitors to knowledge sharing and, subsequently, to organizational innovation. However these studies overlook the possible moderating role of social capital on the abovementioned relationship. This study attempts to address this gap and analyze the moderating role of social capital. The integrative model proposed here examines the moderating influence of social capital on the role of organizational factors such as information technology, innovation culture, organizational structure, reward system and management support on knowledge sharing and the innovation capability of a firm. A quantitative survey was conducted to collect data from 167 Iranian knowledge-intensive firms. This study then employed structural equation modeling to validate and confirm the integrative model using PLS-SEM software. Findings confirmed the direct impact of organizational enablers on knowledge sharing in different demographic variables such as age of the respondents and industry populations. The moderating role of social capital has been supported in two ways: first, the significant path coefficient (t-value) of its interaction with organizational structure and management support in financial firms and with shared language in the whole sample, and secondly, R^2 significant changes of knowledge sharing and innovation capability with the presence of interaction effects in the whole population.

ACKNOWLEDGEMENTS

Dedication

This doctoral dissertation is dedicated to the memory of my father, whose death concurred with my higher education journey, and to my father-in-law, who has been like a father to me through all the years, and who has prepared me with all that was necessary to complete this project. He has always supported me and given me the strength and optimism to persevere through the hard times. His caring words and love have helped me overcome all the barriers I have faced.

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CHAPTER ONE – INTRODUCTION

1.1 Introduction

Based on the knowledge-based theory of a firm, knowledge is the major contributor to organizational success, and this capability is derived from knowledge integration (Grant, 1996b). This consideration has led to the popularity of knowledge management (KM) in businesses in recent decades (Alavi and Leidner, 1999; Zboralski, 2009). As innovation relies heavily on the creation of new knowledge (Nonaka and Takeuchi, 2007), firms are required to invest in knowledge management endeavors to acquire, create, share and apply knowledge rapidly and effectively (Cavusgil et al., 2003). This allows individuals to share their tacit and explicit knowledge with each other in a productive manner and prevent the loss of valuable knowledge.

Most knowledge management initiatives are primarily driven by the adoption of information technologies (IT) (Tsui, 2005). However, many IT-based knowledge management practices fail to raise innovation capability because more emphasis is placed on transferring and sharing explicit knowledge than tacit knowledge (Chanal and Kimble, 2010). This has resulted in a shift from IT-based approaches in knowledge management towards social and integrative approaches (Swan et al., 2000). Concurrent with the shift from traditional IT-driven approaches to integrative approaches, which includes both IT-based and community-based approaches in knowledge management, communities of practice have emerged as a potential tool in the sharing of tacit knowledge (Wenger, 2004; Lesser and Storck, 2001; van den Hooff and De Ridder, 2004b).

According to Wenger (2005), knowledge sharing can be exerted through sharing and exchanging 'know-how' and the expertise of practitioners in communities of practice. Wenger (2004) argues that the best way to manage organizational knowledge is through practitioners – communities of practice members – who use knowledge about their activities and are in the best position to manage it. Wenger's (2004) argument points out that members of communities of practice have a significant role in managing organizational knowledge, and that this requires more attention from organizational management in their KM practice. This rationale clearly emphasizes the potential influence of communities of practice for nurturing knowledge towards innovation. Evidently, Wenger is not the only one who highlighted this notion. Several another authors (Lesser and Storck, 2001; Fontaine and Millen, 2004; Donald, 2004) have also emphasized the role of communities of practice in KM.

Social capital has emerged as an increasingly popular theory and concept in organization and management research. Social capital refers to "networks, norms, trust, and mutual understanding that bind together the members of human networks and communities, and enable participants to act together more effectively to pursue shared objectives" (Widén-Wulff & Ginman, 2004, p. 449).

Communities of practice exist as an engine for developing social capital within every organization (Lesser and Storck, 2001). The social capital theory suggests that social capital strongly influences the extent of interpersonal knowledge sharing (Chiu et al., 2006). Consistent with this theory, social capital and communities of practice provide an underlying environment for behavioural change that leads to greater coordination among individual and business units and eventually to more effective knowledge

sharing, which enhances innovation capability (Nahapiet and Ghoshal, 1998; Lesser and Storck, 2001; Widén-Wulff and Ginman, 2004) .

1.2 Research Background

From the knowledge-based perspective, innovation capability is facilitated and accelerated by the knowledge-sharing process. Knowledge sharing is enabled by knowledge-sharing enablers, which include individual, organizational and technological factors. These factors foster knowledge sharing and in turn enhance innovation capability (Lin, 2007) .
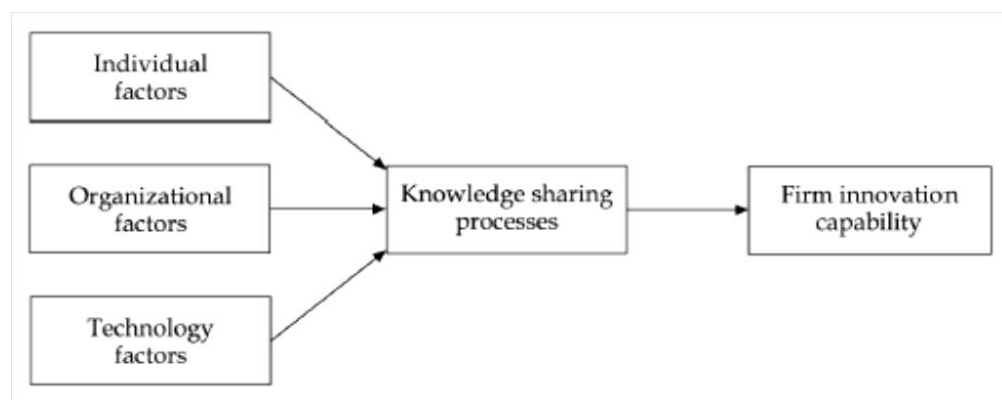
Figure 1.1. A framework for studying knowledge sharing and innovation capability
(Lin, 2007)

Examining the knowledge-sharing process, several authors attempted to identify knowledge-sharing enablers from an organizational perspective by emphasizing organizational context (Liao et al., 2007b; Yu et al., 2007; Rhodes et al., 2008; Ho, 2009; Ipe, 2003; Lilleoere and Hansen, 2011). These studies focused on various organizational factors to assist and enable firms and businesses to manage their organizational knowledge constructively. However, most of these attempts were conducted without consideration for the context of communities of practice and their social capital.

Similarly, several studies which investigated the influence of communities of practice and the impact of their social capital on knowledge sharing, missed their impact and its interaction effect on organizational enablers (Ardichvili, 2008; Zboralski, 2009; Chen and Hung, 2010; Chow and Chan, 2008). Communities of practice and social capital exist in every organization, and they have their own impact, to the extent of knowledge sharing independent of organizational support (Wenger and Snyder, 2000). The enablers might have a different impact on knowledge sharing within the communities of practice context. For example, Bartol and Srivastava (2002) asserted that reward systems can vary in influence according to the extent of knowledge sharing and in different contexts. With regard to the contribution of knowledge to organizational databases, they distinguished between knowledge sharing in formal interactions, knowledge sharing in informal interactions and knowledge sharing within communities of practice (Bartol and Srivastava, 2002). Bartol and Srivastava (2002) stated that the effect and function of rewarding for knowledge sharing are different in formal interactions, informal interactions and in communities of practice. The authors argue that rewards contingent on knowledge sharing are less effective in informal and social network contexts and are more rationalized based on social exchange theory.

The last two decades have been decades of development in Iranian industries. Some knowledge-intensive industries (e.g., banking, financial and pharmaceutical) experienced substantial change, such as liberalization, government de-regulation and technological advances. Companies within these industries have grown rapidly in terms of quantity and capital, resulting in extensive restructuring of the industry and more intense competition. Monopolies were broken, and the private sector started to play a role in various industries such as banking and insurance (Khajepoor, 2000). The private

banking sector joined the market after 2001. Several private financial institutions were established, and three state ownership banks were converted to private ownership (Valahzaghard et al., 2012). The pharmaceutical industry was also influenced by the removal of the government's cheap foreign exchange allocations to the sector (Basmenji, 2004). The distribution monopoly of medicines was broken in 1994 (Rajabzadeh et al., 2013). The domestic pharmaceutical industry experienced a substantial double-digit growth between 2001 and 2009; the share of domestic sales to total sales in 2009 was around 60 percent (Mehralian et al., 2012).

1.3 Statement of the Problem

This study tries to address and investigate the problem of disregarding the context of communities of practice while providing organizational support by management for knowledge sharing and innovation in financial and pharmaceutical industries in the Iranian context. To the best of this author's knowledge, this concern has been overlooked in KM and communities of practice literature in both Iranian and other business contexts until now.

In the current competitive business environment, innovation is regarded as a key element for organizational success. A major part of the economic growth of developed countries comes through innovation (Ghorbani et al., 2012), and yet Iranian industries have suffered from a lack of innovation (Khajepoor, 2000). After those substantial changes in the past two decades, Iranian industries encountered with a new business environment and endeavored to utilize the newly found managerial and academic tools and findings. Innovation and knowledge management are now vital requirements in modern business and have attracted Iranian scholars (Bidmeshgipour et al., 2013) and

practitioners (The World of Economy Newspaper interview with an Iranian insurance company CEO, 2012)[1].

Knowledge-based theory and social capital theory have, in the past, both attempted to explain knowledge sharing and innovation capability. However, studies conducted in each research stream, independent of the other, have disregarded the other theory's potential impact. In effect, one could say that the effect of organizational factors on knowledge sharing might be different in the communities of practice context.

Institutionalizing a proper set of organizational factors – knowledge-sharing enablers – can foster the knowledge-sharing process in a positive way towards higher innovation capability. However, when it comes to community context, the story is different. Existing social capital in a community of practice can alter the effect of these enablers on knowledge sharing. For example, where there are stronger relationships and connectivity between community members, there may be more motivation to use information technology (IT) tools for knowledge sharing; conversely, less connectivity between individuals may mean IT is a less attractive and effective tool for knowledge sharing. This effect can be examined through the interaction of the social capital of communities of practice and the organizational enablers of knowledge sharing. As stated by Wenger (2004), organizational knowledge is managed mainly by practitioners of communities of practice. Thus, an organizational context under KM practice must be configured with an eye on communities of practice and their practitioners, and context and social capital to achieve more effective results.

This study examines the effects of organizational factors on the extent of knowledge sharing in the context of communities of practice in Iranian knowledge-intensive firms.

Moreover, the study tries to understand how the community context can alter and moderate the influence of knowledge-sharing enablers on the extent of knowledge sharing and innovation capability. To do this, we need to look at the relationships among organizational knowledge-sharing enablers, the knowledge-sharing process, the social capital of communities of practice and innovation capability; this study offers a holistic view of how these variables interact and influence one another.

1.4 Scope of the Study

This study is based in the Iranian organizational context targeting the role of communities of practice in innovation capability. The research attempts to highlight the role of organizational factors that underlie knowledge sharing towards innovation capability from a knowledge management perspective in knowledge-intensive firms in the Iranian context where the level of social capital of communities of practice is varied. Financial institutions from the service sector and pharmaceutical firms from the manufacturing sector were selected from the Tehran stock exchange as knowledge-intensive and innovation-oriented businesses. Two top-level managers and five middle-level managers from each organization were selected as targeted respondents. The organizational level has been taken as the unit of analysis.

1.5 Research Questions

The problem outlined above invites several questions needing answers through empirical investigation. This study investigates some of these questions. To accomplish this, the following main research questions were developed:

Question 1. What organizational factors impact on knowledge sharing towards innovation capability?

Question 2. What is the impact of knowledge sharing on innovation capability?

Question 3. What is the role of the social capital of communities of practice in the influence of knowledge-sharing enablers on the extent of knowledge sharing?

Question 4. What is the role of the social capital of communities of practice in the influence of knowledge sharing on the innovation capability of a firm?

1.6 Research Objectives

The main objective of this research is to explore the influence of the social capital of communities of practice on the extent and effectiveness of the knowledge sharing and innovation capability of a firm. This study tries to attract researchers and practitioners' attention to:

RO.1 Examine organizational factors which influence knowledge sharing towards innovation capability.

RO.2 Examine the role of knowledge sharing in innovation capability.

RO.3 Explore the role of communities of practice in the impact of organizational factors on knowledge sharing.

RO.4 Explore the role of communities of practice in the impact of knowledge sharing on innovation capability.

1.7 Significance of the Study

As the previous sections have highlighted, this research combines three separate bodies of literature – knowledge management, innovation and communities of practice (social capital) – to address the research questions. This research examines knowledge-sharing enablers from the social capital perspective, unlike most previous studies which used organizational and knowledge management perspectives. What is missing in previous research is the effect of the interaction between social capital of communities of practice on knowledge sharing and innovation capability.

This study aims to investigate the relationships between organizational factors, the knowledge-sharing process and innovation capability in the context of communities of practice.

Previous research about communities of practice has been conducted in the Western context as well as Japan. Limited research focuses on knowledge-sharing enablers from the social capital perspective within the Iranian social and cultural context. The available studies conducted in Iran report results that are different from other studies in other contexts. For instance, although past studies (e.g. Lin, 2007) indicated that extrinsic reward positively influences individuals to share, a study by Tohidinia and Mosakhani (2010) conducted in Iran indicates otherwise. This study examined knowledge-sharing behaviour and its predictors based on the theory of planned behaviour (TBP) among Iranian firms. The findings implied no significant relationship between expected extrinsic reward and attitude toward knowledge sharing. Bearing this in mind, this study intends to replicate a model on knowledge-sharing enablers in a different context (Iran) to determine if the country's unique identity and background

contradicts the findings of past studies. The current study also aims to address the role of communities of practice in Iranian knowledge-intensive firms and investigate how social capital of communities of practice can alter the influence of organizational factors on knowledge sharing towards innovation capability.

There is a lack of studies that take a holistic view; that is, all of these variables together. For example, in most past research, a single dimension of social capital (either structural or relational) has been considered. In a small number of studies, the structural and relational dimensions of social capital were considered collectively while excluding the cognitive dimension. In reality, different dimensions play different moderating roles in the relationships of organizational enablers, knowledge sharing and innovation capability. This study intends to narrow the gap and test the differences among these three dimensions of social capital on the above mentioned relationship.

Many Iranian companies have attempted to embed innovation in their strategies following their KM practice. The Karafrain Bank, EN Bank, Tosse-eh Credit Institute and several other Iranian knowledge-intensive firms, for example, considered innovation and knowledge management implementation as critical goals and priorities. This research will assist these firms to leverage communities of practice for their goals of being more innovative from a knowledge management perspective.

1.8 Organization of the Thesis

This thesis consists of seven chapters. Chapter one introduces the background to this study and the effect of knowledge sharing on innovation capability from a social capital perspective. It also reviews in brief the concept of community of practice and

social capital theory by focusing on their relationships and application in knowledge sharing.

Chapter two presents theoretical foundations for the proposed model of knowledge sharing among organizations. It attempts to review and link three bodies of literature – knowledge management, innovation and social capital. Highlighting organizational enablers of knowledge from the literature is another section of the literature review for this chapter. Building on the relevant literature, a research framework is proposed, and a research model presented. This chapter also discusses the development of a hypothesis related to the relationship between variables.

Chapter three discusses the research method, research design and development and the operationalization of measures. Furthermore, it discusses the outcomes of the pilot test; reliability and validity, population and sample size and data collection. The chapter concludes with an introduction on the data analysis approach and a summary.

Chapter four describes the data preparation, a reliability and validity assessment of measurements and the techniques employed to validate the integrative research model and test the hypotheses. This chapter also discusses the rationale for the selection of appropriate data analysis approaches.

Chapter five explains the analysis of the data using the PLS-SEM approach. It begins with the measurement model and continues with a discussion of the structural model and hypothesis testing.

Chapter six discusses the findings of the study. It points out the limitations of the study and follows with recommendations for future research. The chapter ends with the thesis conclusion.

CHAPTER TWO – LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature review and discusses theoretical foundations for the development of the research model for the study. Several theories and models of knowledge sharing, innovation and social capital literature are discussed. From knowledge-sharing literature, organizational enablers of knowledge sharing are identified and reviewed. Innovation literature is reviewed from a knowledge management perspective with a focus on the relationships between knowledge sharing and innovation. Theories of communities of practice and social capital are also reviewed from the perspectives of knowledge management and innovation. The review of the literature will be continued based on the proposed framework with discussing organizational factors which facilitate knowledge sharing and the relationship between knowledge sharing and innovation capability. The moderating role of social capital will be reviewed in the next. The chapter ends with the hypothesis development section.

2.2 The Importance of Knowledge Management

Building on the resource-based view and the knowledge-based view, recognition of knowledge as the key resource of today's organizations justifies the requirement for processes that facilitate the creation, sharing and leveraging of individual and collective knowledge. Schmetz (2002), Yao, Kam and Chan (2007) and Blankenship and Ruona (2009) underline information and knowledge sharing as the heart of knowledge management processes. Schmetz (2002) asserts that most people hold the view that sharing knowledge means losing power. As such, knowledge sharing

can only be promoted by compensating for the loss of power with the disclosure of information needed by others (Yao et al., 2007). Thus, this process is essential in translating individual knowledge into organizational knowledge.

Many studies support the view that effective knowledge management contributes to innovation and the improved performance of organizations and businesses (Darroch and McNaughton, 2002; Darroch, 2005; Cantner and Kristin, 2007; Du Plessis, 2007).The knowledge sharing process is identified as an important process for knowledge creation and innovation (Ipe, 2003; Lin, 2007; Lin and Lee, 2006; Mohd Nor and Egbu, 2010; Hassan and Al-Hakim, 2011).Various factors, so-called knowledge-sharing enablers, support knowledge sharing in organizations. Communities, and specifically communities of practice, are increasingly seen and recognized by researchers and executives as a vehicle for knowledge sharing and innovation in organizations (Lesser and Storck, 2001; Ardichvili et al., 2003; Ardichvili et al., 2006; Coakes and Smith, 2007; Chanal and Kimble, 2010; Zboralski, 2009; Murillo, 2011).

This literature review examines the literature by discussing the distinction between data, information and knowledge, the definition of knowledge, different types of knowledge, knowledge sharing, and knowledge-sharing enablers and innovation capability and their relationships. This chapter also looks at the role of social capital and communities of practice in influencing knowledge sharing, and eventually, its effect on innovation capability.

2.3 The Definition of Knowledge, Information and Data

Before defining knowledge, a clear distinction must be made between the three concepts of data, information and knowledge. This is because, in many organizations, managers see and use these concepts interchangeably and do not assume much difference between them (Davenport and Prusak, 1998; Nonaka and Takeuchi, 2007).

Most scholars distinguish between data, information and knowledge. Nonaka (1994) in his well-known article defined information as "a flow of meaningful messages", and asserted that knowledge is a "justified true belief" (p. 15). Van der Spek and Spijkervet (1997) define data as symbols with no interpretation, information as meaningful data and knowledge as the ability of an individual to assign meaning. Tiwana (2000), from the perspective of a firm, defines data as "a set of particular and objective facts about an event or simply the structured record of a transaction" (p. 59). According to Alavi and Leidner (2001), "data is raw numbers and facts" while information is "processed data" and knowledge is "information possessed in the minds of individuals" (p. 109). Tsoukas and Vladimirou (2001) define data as "an ordered sequence of given items or events". They extend this definition for information, calling it "a context-based arrangement of items whereby relations between them are shown".

Knowledge is defined by Tsoukas and Vladimirou (2001) as "a judgment of the significance of events and items, which comes from a particular context and/or theory" (p. 976). Consistent with Van der Spek and Spijkervet, Bellinegr and his colleages (2004), state that data are only symbols. They also believe that adding meaning to data converts it into information while the application of data and information lead to knowledge (Bellinger et al., 2004). Bellinger and his colleagues (2004) followed and quoted Ackoff's distinction and definition of data, information and knowledge, and

defined knowledge as the "application of data and information", pointing out that knowledge provides the answer for questions and action taking (p. 2). Davenport and Prusak (2000) defined data as "a set of discrete facts". According to them, data is transformed into information by adding value in various ways.

Davenport and Prusak (2000) suggested five methods for adding value to data to transform it into information. The five methods, which all begin with the letter C, are contextualized, categorized, calculated, corrected and condensed. In the contextualized method, the purpose for which the data is gathered differentiates it. When we have knowledge of the key components of data, this is a categorized method. Analyzing data mathematically or statistically transforms it through the calculated approach. When we remove errors from data we are using the corrected method, and the condensed method is summarizing data into a more concise form (Davenport and Prusak, 2000).

Based on their defintion of data and information, Davenport and Prusak (2000) developed a pragmatic definition for knowledge which highlights characteristics that make knowledge valuable yet difficult to manage. In their working definition Davenport and Prusak (2000) asserted that "knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information" (p. 5). In Table 2.1, some of the most cited distinctions and definition of data, information and knowledge are synthesized.

Based on most defintions, we can conclude that the significance of data is purely its existence. It can exist in different forms which may or may not be usable (Bellinger et al., 2004). According to Bellinger and his colleages (2004), data are only such symbols.

The common point in all definitions is that data is a raw fact or number and simply exists, with no specific meaning.

Table 2.1: Some definitions of data, information and knowledge

Author(s)	Data	Information	Knowledge
Nonaka, 1994	-	A flow of meaningful messages	Justified true belief
Spek & Spijkervet, 1997	Not yet interpreted symbols	Data with meaning	The ability to assign meaning
Davenport & Prusak, 2000	A set of discrete facts	A message meant to change the receiver's perception	Experience, values, insights, and contextual information
Alavi & Leidner, 2001	Raw numbers and facts	Processed data	Information possessed in the mind of individuals
Tsoukas & Vladimirou, 2001	An ordered sequence of given items or events	A context-based arrangement of items whereby relation between them are shown	A judgment of the significance of events and items, which comes from a particular context and/or theory
Bellinger et al. 2004	Symbols	Data that are processed to be useful	Application of data and information

Information is processed and context-based data in which there is a relational connection between its items (Alavi and Leidner, 2001; Tsoukas and Vladimirou, 2001; Bellinger et al., 2004). Unlike data, information is meaningful. By adding meaning to data, it is no longer data; it becomes information (Bellinger et al., 2004). Information is useful by providing answers for who, what, where and when questions (Bellinger et al., 2004). In a nutshell, the definitions and implications for information are limited to its meaningfulness and usefulness but not yet application.

Most definitions for knowledge attempted by various scholars emphasize that knowledge is a more individualized concept. Nonaka (1994) stresses that knowledge is a more dynamic and personal concept and is related to human action (p. 15). Other authors' definitions also emphasize the reliance of knowledge on individuals and human beings. Van der Spek and Spijkervet (1997) define knowledge as the ability of an individual to assign meaning. Alavi and Leidner (2001) define knowledge as "information possessed in the mind of individuals" (p. 109). The definition by Davenport and Prusak (2000) characterizes knowledge as a complex, fluid, intuitive combination of various elements, and formally structured. Using Davenport and Prusak's definition of knowledge, Lin (2007) concludes that knowledge originates from and is applied in the mind of the person who owns it. From an organizational perspective, this definition includes both types of knowledge – explicit and tacit.

2.4 Knowledge Types

A common categorization of knowledge is into explicit and tacit knowledge. Nonaka and Takeuchi (2007) define explicit knowledge as knowledge which has been codified and expressed in formal language. On the other hand, tacit knowledge is difficult to express, represent and communicate; it is intuitive, unarticulated and cannot be verbalized (Li and Gao, 2003). Tacit knowledge is a more personal and less familiar, unconventional form of knowledge. Tacit knowledge is not codified, it is obtained by sharing experiences and know-how and by observation and imitation (Seidler-de Alwis and Hartmann, 2008; Hall and Andriani, 2002). Both tacit and explicit knowledge are complementary and necessary for knowledge creation. As elaborated by Nonaka et al. (2000), knowledge is created via a spiral type of conversion between explicit and tacit

knowledge. Sharing both kinds of knowledge is therefore vital for knowledge creation and innovation.

2.5 Knowledge Management

According to Alavi and Leidner (2001), knowledge management refers to "identifying and leveraging the collective knowledge in an organization to help the organization compete" (p. 113). Following Hackbarth (1998), these authors also point out that knowledge management is intended to enhance innovativeness and responsiveness. In general, the main objective of knowledge management is to ensure the right knowledge is accessible to the right person at the right time and at the right cost (Holsapple and Joshi, 2000).

Elaborating on Holsapple and Joshi's (2000) statement, one might say that to succeed in today's competitive world of business, organizations need to reduce their cycle time and operation costs, enhance employee productivity and performance and increase their agility. These critical business activities require continued efforts to acquire, create, document, share and apply knowledge by employees at all levels. Due to the importance of the knowledge management process for success, organizations have invested heavily in it.

Researchers have identified many key processes of knowledge management. The list includes capturing, acquisition, creation, storage/retrieval, retention, distribution, sharing, transfer, use and application (De Long, 1997; Skyrme and Amidon, 1998; Spender, 1996; Alavi and Leidner, 2001). Shin and his colleagues (2001) classify these processes under four main categories; creation, storage, distribution and application.

Among these processes, knowledge distribution, or better known as knowledge sharing, is probably acknowledged as at the heart of knowledge management processes (Yao et al., 2007; Blankenship and Ruona, 2009).The basis of this acknowledgement lies in the role of knowledge sharing. Acquisition and storage of knowledge is only beneficial if it is being shared and used. Similarly, the extent of knowledge sharing influences the level of knowledge creation (Ipe, 2003; Lin and Lee, 2006) .

2.6 Knowledge Sharing

Ipe (2003) defined knowledge sharing as a spontaneous act and distinguished it from reporting. According to Ipe (2003), reporting involves the delivery of information based on some routines or organized formats. Sharing, on the other hand, implies an intended act by an individual to participate in the knowledge exchange while there is no pressure to do so. Van Den Hooff and De Ridder (2004b) defined knowledge sharing as a process where individuals mutually exchange their implicit (tacit) and explicit knowledge to create new knowledge. There are basically two processes for knowledge sharing; knowledge donating and knowledge collecting. Knowledge donating is defined as "actively communicating to others what one knows", and knowledge collecting described as "actively consulting others in order to learn what they know" (van den Hooff and De Ridder, 2004b). This differentiation is consistent with Ardichvili et al.'s (2003) description of these two processes. Knowledge donating refers to the supply of new knowledge whereas knowledge collecting is related to the demand for new knowledge. As depicted in Figure 2.1, the proposed research framework is as shown in the next page:

Organizational factors
Information technology
Innovation culture
Organizational structure
Reward system
Management support

Social capital

Knowledge sharing

Innovation capability
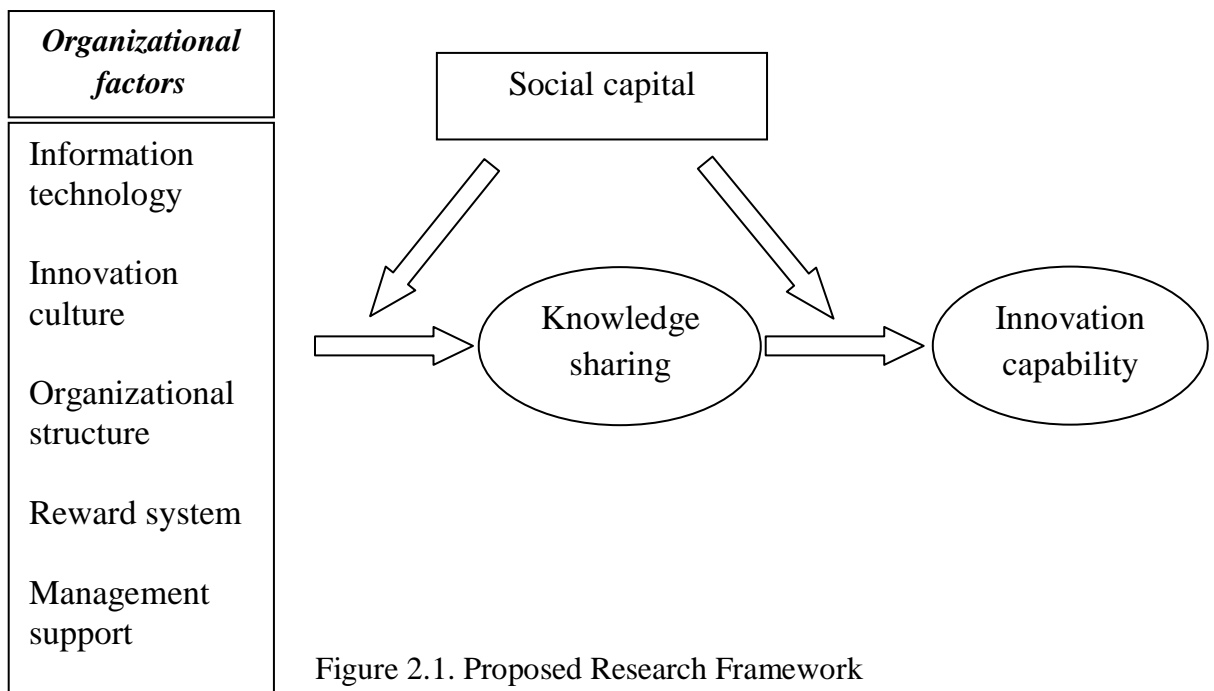
Figure 2.1. Proposed Research Framework

2.7 Knowledge-Sharing Enablers

Knowledge sharing is a multi-dimensional activity and therefore involves several contextual, cognitive and communicative skills. Several studies focusing on the knowledge-sharing process were based on various theories and different perspectives, such as behavioural, social, cultural and innovation. Based on resource-based theory and the knowledge-based view, researchers attempted to identify the most important organizational factors that facilitate knowledge sharing in the most effective way. The enablers of knowledge sharing can be categorized under one of the following factors: technological, individual, structural, cultural and organizational factors (Lin and Lee, 2006; Lin, 2007; Yang and Chen, 2007). These enablers include factors such as organizational culture, organizational climate, information technology, organizational structure, managerial support, reward system, organizational learning communities, human resource management, evaluation systems and leadership and strategy.

To select knowledge-sharing enablers for this study, three criteria were considered; first, as innovation capability is targeted as one of the prominent outcomes of knowledge sharing, factors with more support from previous studies were selected. This led us to reject some factors. Second, study limitation forced the author to focus on the more important and common organizational predictors of knowledge sharing, but with re-examination of their effects in communities of practice. Lastly, as this framework was to be tested from a social capital perspective, and in the communities of practice context, another selection criterion was the potential effect of social capital factors on the relationship between organizational factors and knowledge sharing. Eventually, information, organizational culture, organizational structure, reward system and management support were selected as the study's knowledge-sharing enablers.

Table 2.2: Prior studies on some organizational enablers and knowledge sharing

Organizational enabler	Past studies
IT	Gold et al. 2001; Lin and Lee 2006 ; Kim and Lee 2006 ; Al-Alawi et al. 2007 ; Lin 2007 ; Ardichvili 2008 ; Zawawi et al. 2011
Organizational culture	Gold et al. 2001 ; Erhardt 2003 ; Kim and Lee 2006 ; Al-Alawi et al. 2007 ; Lin 2007 ; Ardichvili 2008
Top management support	Ruggles 1998 ; Lin and Lee 2004 ; Lin 2006 ; Lin 2007 ; Wee 2012
Reward system	Al-Alawi et al. 2007 ; Lin 2007 ; Choi et al. 2008 ; Zawawi et al. 2011; Wee 2012
Organizational structure	Gold et al. 2001 ; Kim and lee 2006 ; Al-Alawi et al. 2007

Table 2.2 provides a list of prior studies on these most popular knowledge-sharing enablers. The current study intends to examine the moderating role of social capital between enablers of knowledge sharing, knowledge sharing *per se* and innovation capability. Table 2.3 provides a summary of past research on the relationship between

knowledge-sharing and innovation capability, as this relationship is also to be tested directly and with the intervention of social capital.

Table 2.3: Prior Studies on Innovation and Knowledge Sharing

Author (year)	Perspectives Purposes	Predictors	Intervening	Dependent
(Calantone et al., 2002)	Learning orientation	Commitment to learning Shared vision Open-mindedness Intra-organizational knowledge sharing	Firm innovativeness	Firm performance
(Darroch, 2005)	KM role investigation	Knowledge acquisition	Knowledge dissemination Responsiveness to knowledge	Innovation
(Lin, 2007)	Org enabler, KS and Innovation	ICT use Reward system Top management support	Knowledge donating Knowledge collecting	Innovation capability
(Liao et al., 2007b)	KS and innovation relationships	Knowledge donating Knowledge collecting	Absorptive capacity	Innovation capability
(Rhodes et al., 2008)	Organizational context	IT Learning strategy Trust culture Flexible structure	Knowledge transfer	Innovative capabilities
(Lin and Chen, 2008)	Organizational integration	Internal integration External integration	Shared knowledge Firm innovation capability	Product competitive advantage
(Kamasak and Bulutlar, 2010)	KS and innovation relationships	Knowledge donating Knowledge collecting	NA	Exploitative innovation Exploratory innovation Ambidexterity
(Hassan and Al-Hakim, 2011)	CSFs of KM and Innovation	HRM, IT , Leadership Organizational learning Organizational strategy Organizational structure Organizational culture	Innovation	Organizational performance

A review of earlier studies investigating the relationship between knowledge sharing and innovation highlights important findings. First, knowledge sharing showed significant potential to enhance organizational innovation. Second, organizational enablers of knowledge sharing indicated an influence on innovation capability. Finally,

these organizational enablers had a direct impact on innovation (Lin, 2007; Rhodes et al., 2008; Hassan and Al-Hakim, 2011).

The next section reviews the literature on relationships between organizational enablers, knowledge sharing and innovation capability. This is followed by a section reviewing the literature on the relationships of communities of practice of social capital with the variables of the current research model.

2.7.1 Information Technology

Information technology (IT) is often cited as the most important factor in the technological category, and is acknowledged as an effective tool of knowledge sharing in the literature. Despite its popularity, researchers have shed doubt on IT's capability as an effective knowledge-sharing facilitator. Hislop (2002) critiques the capability of IT as an efficient tool for sharing tacit knowledge. However, he agrees with its use in explicit knowledge sharing in the social context, and in situations where trust exists between individuals. Similarly, van den Hooff et al. (2003) conclude that information and communication technology (ICT) can contribute to knowledge sharing in the context of communities of practice in terms of trust and identification between community members. Mohamed et al. (2006) also challenged the efficiency of IT usage to reach and obtain knowledge and suggested a relook at IT deployment, harmonizing it with leadership/management and organizational learning to improve efficiency and innovation. These researchers asserted that IT is just a tool, and as such would be helpless in knowledge sharing if not properly used (Mohamed et al., 2006).

Other studies have justified IT usage as an effective enabler of knowledge sharing in non-specific terms (Lin, 2007; Rhodes et al., 2008; Ho, 2009). Ho (2009), for example, in her paper studying the correlation between KM enablers and performance indices of KM, identified IT as one of four important knowledge management enablers. She also quoted several studies (Alavi and Leidner, 1999; Hendriks, 1999; McDermott, 1999; Zack, 2002) who identified and emphasized IT as an important critical success factor for knowledge management processes which includes knowledge sharing.

2.7.2   Organizational Culture

Organizational culture or climate is another influential factor in the organizational context which can influence the sharing of knowledge (McDermott and O'Dell, 2001; De Long and Fahey, 2000). Researchers have disagreed about the role of organizational culture or climate in promoting knowledge sharing; it can be an enabler as well as a barrier (Erhardt, 2003). Although there is debate in the literature that organizational culture and organizational climate are different concepts, according to Denison (1996), Bock et al. (2005a) and McLean (2005), the differences are in perspective rather than substance, and both address a common phenomenon − the creation and influence of social context in organizations.

This study is aimed at investigating the effect of organizational factors which promote knowledge sharing and innovation capability; an innovative culture is the one able to develop knowledge sharing towards higher innovation capability. Essentially, for any organization to be innovative, the organizational culture must be capable of enhancing both knowledge sharing (Lemon & Sahota, 2004) and innovation capability (Dobni, 2008; Martins & Terblanche, 2003) concurrently. With an

organization's focus on innovation – the organization's general cultural orientation towards innovation – it is possible to achieve a certain level of innovation capability (Dobni, 2008). In their investigation, Bock et al. (2005a) also confirm there is more intention to share knowledge once an organizational climate is characterized by innovation.

Developing an instrument for an innovative culture, Dobni (2008) identified seven factors that characterize innovation culture – innovation propensity, organizational constituency, organizational learning, creativity and empowerment, market orientation, value orientation and implementation context. These factors are grouped into four categories; innovation propensity and organizational constituency as innovation intention; organizational learning, creativity and empowerment as innovation infrastructure; market orientation and value orientation as innovation influence, and implementation context as innovation implementation (Dobni, 2008). The two former categories are management-centric and the two latter employee-centric dimensions (Dobni, 2006) .

Innovation intention refers to strength of an organization's propensity to innovate (Cañibano et al., 2006), and how well employees contribute towards innovation (Dobni, 2008). The first part is labeled innovation propensity and the latter organizational constituency (Dobni, 2008) . Innovation propensity is the clear tendency of innovation to be found in organizational vision and goals, where innovation is seen as a core value and culture by employees, and where they are more likely to seek more opportunities through sharing their experiences and knowledge to be more innovative (Dobni, 2006). On the other hand, organizational constituency is the level to which employees are necessarily engaged in the

innovation process and realize their roles and contribution towards innovation within the organization (Dobni, 2008). According to Riege (2005), the goal of sharing knowledge is better achieved if there is a clear connection between organizational vision – innovation and overall company goal – and higher innovation capability. To have a strong objective for innovation, a proper organizational constituency as well as innovation propensity in vision and goals is required. Clearly, this implies that a culture supportive of innovation intention is needed.

Besides having a serious intention for innovation, an organizational culture must also provide a proper infrastructure for innovation to promote knowledge sharing and innovation. This infrastructure may include employee creativity and empowerment (Martins and Terblanche, 2003) and organizational learning (Dobni, 2008). To present an appropriate innovation culture in the organizational context, firms need to make sure their employees are motivated towards continuous learning and prepared with significant empowerment. Organizational learning is defined as "the degree to which training and educational opportunities of employees are aligned with innovation objectives" (Dobni, 2008). Through organizational learning, employees must be encouraged to develop new skills and capabilities. An organizational culture which supports and encourages continuous learning should support knowledge sharing, as employees need to keep their knowledge up to date; this could be done through knowledge sharing (Martins and Terblanche, 2003). According to Alavi et al. (2006), learning generally promotes and encourages knowledge sharing.

In addition to learning, employees must be empowered and allowed to be creative so as to facilitate their contribution towards innovation. Empowerment and creativity are fundamental elements for an organizational culture with an innovation focus (Martins

& Terblanche, 2003). Empowerment refers to how innovation is implemented by the organization and the employee (Dobni, 2008). Empowerment is related to information and knowledge sharing (Dobni, 2006). It can be explained in such a way that individuals offer their opinion and share their knowledge regarding innovation implementation with more autonomy. Beyond empowerment, supporting and encouraging employees to be more creative is another important aspect of an organizational innovation infrastructure necessary for an innovation culture.

2.7.3   Organizational Structure

Organizational structure is another frequently mentioned enabler of intra-organizational knowledge sharing (Yang and Chen, 2007). However, some studies have identified organizational structure as an inhibitor of knowledge sharing (Lee and Choi, 2003). Organizational structure can be an enabler or inhibitor of knowledge sharing depending on the characteristics of the structure of an organization (Lee and Choi, 2003; Ardichvili et al., 2003; Hassan and Al-Hakim, 2011).

Organizational structure can be defined as "the result of the combination of all the ways in which work can be divided into different tasks, the coordination of which must subsequently be ensured" (Claver-Cortés et al., 2007). Ruggles (1998), in his study investigating 431 US and European firms, reports that organizational structure is an important knowledge-sharing antecedent. Yang and Chen (2007) also assert that organizational structure is an important factor for developing organizational knowledge capability.

Syed-Ikhsan and Rowland (2004) state that as an inhibitor, traditional and hierarchical models of organizational structure are less effective in enhancing organizational knowledge sharing. In a more hierarchical structure, communication functions would be in a "top down" manner, and speed of information and knowledge flow is gradual. Centralization and organizational hierarchy have been cited as one of the main knowledge-sharing barriers (Ardichvili et al., 2003; Serenko et al., 2007). Tsai (2002) argues that centralization and organizational hierarchy unintentionally prevent knowledge flow. He asserts that knowledge provision to other units and departments within a firm may not be formally authorized by the firm's management. The definition of centralization here is borrowed from Lee and Choi (2003) who describe it as "the degree of authority and control over decisions" (p.222) .

Fundamentally, researchers have shown that a less centralized organizational structure promotes knowledge sharing among employees. Considering organizational structure as an enabler, Rhodes et al. (2008) confirmed that a flexible structure has a positive effect on knowledge transfer. A flat and decentralized structure is helpful in establishing many connections between employees (Chow and Chan, 2008; Wang and Noe, 2010).

Based on Nonaka and Takeuchi's (2007) study, Mohamed et al. (2009) suggested adding the dimension of flexibility while maintaining the hierarchical structure to overcome the negative effect of a formal hierarchical structure. This, in turn, is said to be able to improve knowledge creation and sharing capabilities. Hassan and Al-Hakim (2011) asserted that implementing knowledge management requires choosing a suitable organizational structure. An appropriate (flexible) organizational structure will help maintaining the continuity of creating new knowledge and sharing knowledge. This

organizational structure can encourage the team spirit and increase the exchange of ideas and knowledge. The level of formalization in this type of structure is low and there is decentralization in the decision-making process (Hassan and Al-Hakim, 2011).

2.7.4 Reward System

Another important organizational factor that influences knowledge sharing is the reward and incentive system (Yang and Chen, 2007; Riege, 2005; Bartol and Srivastava, 2002; Bock and Kim, 2002).

Bartol and Srivastava (2002), in their specific study investigating the role of organizational reward on knowledge sharing, asserted that several organizations have practised reward systems to encourage knowledge sharing among employees. They also implied that organizations resort to using suitable reward systems when they realize there is a lack of knowledge sharing among employees due to lack of motivation, fear of losing power and superiority, a perception of inefficiency of the reward system, and a lack of time and resources (Bartol and Srivastava, 2002). Reward can be intrinsic, such as enjoyment from doing the task itself, or extrinsic in the form of monetary and non-monetary reward. Monetary reward refers to incentive in the form of cash whereas non-monetary reward instances are promotion, job security and educational opportunity (Bartol and Srivastava, 2002; Choi et al., 2008). Considering monetary reward and extrinsic motivation, these researchers propose four major mechanisms for knowledge sharing, reflecting codification and personalization strategies – contribution to database, knowledge sharing in formal interactions, informal interaction and communities of practice.

According to Bock and Kim (2002), two main theories can explain the relationship between reward system and knowledge-sharing behaviour – the economic exchange theory and the social exchange theory. The economic exchange theory is based on the rationale of self-interested behaviour; that is, there must be more benefit than cost for an action to be performed by an individual. In this case, there must be reward that exceeds the knowledge a person shares. This is the theoretical foundation of running incentive and reward systems for fostering knowledge sharing in organizations. In most cases, organizations adopt a system that incorporates a range of extrinsic and monetary rewards (Bock and Kim, 2002). Building on the economic exchange theory, conducting an incentive system is easy when knowledge sharing happens in the form of contribution to a database or in formal interactions. However, it is more difficult to base a reward system on economic exchange theory for knowledge sharing in and contributions to informal interactions and communities (Bartol and Srivastava, 2002).

On the other hand, the social exchange theory explains the influence of reward on knowledge sharing in the informal context such as a community of practice (Bartol and Srivastava, 2002). According to this theory, knowledge sharing is based on intrinsic motivation and non-monetary reward. What facilitates knowledge-sharing behaviour in communities of practice in terms of benefits is the extent of trust and citizenship among community members. Reward also can play a role in these contexts, in the sense that trust may be developed between employee and employer as individuals perceive the fairness of reward systems (Bartol and Srivastava, 2002). According to Bock and Kim (2002), obligation is another function for knowledge sharing in the context of community of practice that will make the impact of a reward less effective on knowledge sharing. In communities of practice, a newcomer who asks for help is

obligated to return the favour later without expected reward; this would be based on mutual expectations and norms.

Cabrera and Cabrera (2005) emphasized that perceived costs and rewards are key practices that can foster knowledge sharing. They assert that rewarding knowledge sharing behaviour sends a signal to employees that their behaviour and performance are valuable to the management and the organization. However, they alert organizations to the danger and pitfalls of a reward system, such as financial and monetary systems, which can lead to competition between employees (Cabrera and Cabrera, 2005).

Riege (2005) implied that the lack of transparent reward and recognition systems impedes sharing knowledge, and is a significant knowledge-sharing barrier. He also mentioned that although there has been debate for several years about the effectiveness of reward systems in fostering knowledge sharing, management and leadership still rely on the reward system as one of the best ways to highlight knowledge sharing (Riege, 2005). Al-Alawi et al. (2007) cited Syed-Ikhsan and Rowland's (2004) statement emphasizing the need for a strong motivator for employees to share knowledge. In an empirical work, Al-Alawi et al. (2007) investigated five organizational factors, called organizational culture dimensions, on knowledge sharing. They reported a positive relationship between the effectiveness of reward systems and knowledge-sharing behaviour in 98 Bahraini organizations. Studying knowledge-sharing behaviour and its predictors, based on the theory of planned behaviour (TBP) in the Iranian context, Tohidinia and Mosakhani (2010) asserted there was no significant relationship between expected extrinsic reward and attitude towards knowledge sharing. Despite some assertion of no significant or positive influence of a reward system extrinsic or intrinsic – on knowledge-sharing intention, Choi et al. (2008), in their examination of socio-

technical enablers of knowledge sharing, found positive effects of intrinsic and extrinsic rewards on knowledge-sharing intention; they showed that intrinsic rewards have a greater influence.

2.7.5   Management Support

Senior management support is another key factor in knowledge sharing (McDermott and O'Dell, 2001; Wang and Noe, 2010; Lin, 2007). That senior management support in knowledge management initiatives is essential is confirmed by Davenport (1997) and Huysman and de Wit (2004). Connelly and Kelloway (2003) noted perceptions of management support for knowledge sharing as a positive predictor of a knowledge-sharing culture. Lee et al.(2006) tested the effect of top management support on the level of knowledge sharing through employees' commitment, and reported a significant relationship. Citing Rycroft and Kash (2002), Lin (2006) asserted that top management support increases the innovation capability of the firm through knowledge sharing. According to Lin (2007), top management support for knowledge sharing includes but is not limited to management awareness of the importance of knowledge sharing; expressing, supporting, giving encouragement and providing resources for knowledge sharing. It means that senior management must indicate concern for KS, express it in public and provide resources for KM pragmatically. Building on prior research, in a recent study, Wee (2012b) tested four knowledge-sharing enablers and concluded that top management support was the most important and significant enabler. Results of previous studies indicate that top management support plays a crucial role in knowledge sharing in organizations.

2.8 Knowledge Sharing and Innovation Capability

Du Plessis (2007) defines innovation as the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business processes and structures and creating market-driven products and services. Liao and his colleagues (2007b) classified the innovation capability of a firm into three categories; product, process and managerial innovation. Lin and Chen (2008) conceptualized firm innovation capability from two perspectives; the first perspective views it as a behavioural variable that reflects the rate of adoption of innovation by the firm. The second perspective views firm innovation capability as an organization's willingness to change.

Interest in the effective management of knowledge to achieve organizational goals, such as innovation, is reflected in a rapidly growing literature (Al-Hakim & Hassan, 2011; Brand, 1998; Carneiro, 2000; Darroch & McNaughton, 2003). Effective knowledge management is often cited as an antecedent of innovation. In other words, innovation has been always driven by knowledge management and its processes (Darroch and McNaughton, 2003; Nonaka and Takeuchi, 2007). Darroch (2005) applied the economic theory of resource allocation in the field of knowledge management and suggested that effective knowledge management supports the conversion of all other resources into organizational capabilities, for example, innovation.

Among knowledge management practices, knowledge sharing has been acknowledged as one of the most important contributors to innovation. The relationship between knowledge sharing and innovation capability has been addressed and investigated by

several authors in KM literature (Darroch, 2005; Lin and Lee, 2006; Du Plessis, 2007; Liao et al., 2007b; Lin, 2007; Lin and Chen, 2008; Zhi-hong et al., 2008; Taminiau et al., 2009; Kamasak and Bulutlar, 2010).

Without specifying the knowledge type (tacit/explicit) or context (formal/informal), several authors supported the view that knowledge sharing has a vital role in innovation capability. Calantone and his colleagues (2002) confirmed the positive effect of knowledge transfer on firm innovation capability. Lin (2007) conducted a study focused on the relationship between knowledge-sharing enablers and processes and the innovation capability of a firm. The author classified the knowledge-sharing process into knowledge donating and knowledge collecting. This study empirically confirms the positive effects of knowledge donating and knowledge collecting on innovation capability. Lin and Chen (2008) asserted that shared knowledge through internal and external integration will lead to higher innovation and new product development (NPD), and consequently to competitive advantage. Lin and Chen (2008) justify that knowledge must be shared to be more available in the organization and NPD teams contexts.

With regard to the formality of the knowledge-sharing process, Taminiau and her colleagues (2009) interviewed 29 consultants on informal knowledge sharing and innovation barriers. The interviewees disclosed that knowledge is a critical factor for innovation. Taminiau et al. (2009) discovered that the creation of new knowledge is generally an output of knowledge sharing through informal networks such as lunch-time discussion. However, to convert newly created knowledge into innovative service, it has to go through formal organizational meetings and have organizational support for

innovation (Taminiau et al., 2009). This implies that lack of organizational support for new idea leads to knowledge loss, and is considered an innovation barrier.

Kamasak and Bulutlar (2010) investigated the influence of knowledge donating and knowledge collecting within and outside organizational departments on exploratory and exploitative innovation. Exploratory innovation is pursuing new knowledge and developing new products and services from emerging markets, while exploitative innovation is improving and extending existing products and services from existing customers (Jansen et al., 2006c). The study results show that knowledge collecting has a significant effect on ambidextrous innovation; meanwhile knowledge donating inside the department has a significant effect only on exploitative innovation, and knowledge donating outside the department did not have any impact on any innovation. Another study focusing on the context for knowledge sharing by Wang and Noe (2010), asserted that knowledge sharing among employees and within and across teams is a fundamental contributor to knowledge application, innovation and competitive advantage. Knowledge sharing allows organizations to exploit knowledge-based resources and influences a firm innovation capability (Wang and Noe, 2010).

2.9 Communities of Practice, Social Capital, Knowledge Sharing and Innovation

2.9.1 Communities of Practice

As an organizational form, the concept of community of practice was introduced by Wenger (1999) in his book *Communities of practice: Learning, meaning, and identity*. Wenger and Snyder (2000) defined community of practice as, "groups of people informally bound together by shared expertise and passion for a joint enterprise"

(p. 139). They asserted that communities of practice are capable of several organizational activities, such as driving strategy, generating new lines of business and developing employees' skills. This concept has been widely addressed in several studies in learning, knowledge management, social capital and innovation literature.

2.9.2 Social Capital

Widén-Wulff and Ginman (2004) highlighted that context affects the outcome of knowledge sharing. They assert that social capital needs to be examined in different contexts, especially in today's business environment in which there are manifold groups and networks within organizations. Social capital refers to the "networks, norms, trust, and mutual understanding that bind together the members of human networks and communities, and enable participants to act together more effectively to pursue shared objectives" (Widén-Wulff & Ginman, 2004, p. 244).

Social capital was introduced into management and organizational studies by Nahapiet and Ghoshal (1998) in their well-known study entitled "Social capital, intellectual capital, and the organizational advantage". The authors defined social capital as "the sum of the actual and potential resources embedded within, available through and derived from the network of relationships possessed by an individual or social unit" (p. 243). They further categorized social capital into three distinct dimensions – structural, relational and cognitive dimensions (Nahapiet and Ghoshal, 1998).

The structural dimension refers to the network and overall pattern of connections between social unit members. The relational dimension refers to assets created and leveraged after the structural connection is established. These assets may include norms and sanction, trust and trustworthiness, identity and identification and obligation and

expectation (Nahapiet and Ghoshal, 1998). The cognitive dimension refers to "those resources providing shared representations, interpretations, and systems of meaning among parties" (Nahapiet & Ghoshal, 1998, p. 244).

2.9.3 Communities of Practice and Social Capital

Lesser and Storck (2001) examined the role of communities of practice in organizational performance, and noted that organizational performance was influenced by the ongoing activities of communities of practice. However, the association between community of practice and performance remains unclear because it is difficult to assess their contribution and outcome directly. This can be attributed to the lack of formal structure and visibility of communities of practice within organizations (Lesser and Storck, 2001). Therefore, in order to establish a link between the contribution of communities of practice towards organizational capability, Lesser and Storck (2001) suggest assuming the community of practice as an engine for developing social capital within an organization. In this way, social capital develops an environment which influences the overall business performance of the firm (Lesser and Storck, 2001; Leana and Pil, 2006).

2.9.4 Communities of Practice, Social Capital and Knowledge Sharing

The impact of social capital on knowledge sharing has been explored in several studies. For instance, Cabrera and Cabrera (2005), in their exploratory study and applying Nahapiet and Ghoshal's (1998) social capital dimensions, proposed a relationship between the structural and cognitive dimensions with knowledge-sharing behaviour and the relational dimension with knowledge-sharing motivation. The

authors categorize structural and cognitive dimensions under facilitating factors and relational dimension under encouraging factors for knowledge sharing.

Muhammed (2006) investigated the influence of the characteristics of community of practice on KM practice and their effect on individual outcomes, team outcomes and task knowledge. The author categorized KM practice into knowledge creation, knowledge capture, knowledge sharing, knowledge access, and knowledge application. As with several past studies, Nahapiet and Ghoshal's (1998) social capital framework was also used in this study.

Similarly Chow and Chan (2008), in a study based on reasoned action and social capital theories, developed a theoretical framework and examined the relationships between the social capital dimensions of the social network, social trust and shared goals with the theory of reasoned action factors; subjective norms about knowledge sharing, attitude towards knowledge sharing and intention to share knowledge. The authors defined attitude towards knowledge sharing as "the degree of one's favorable or positive feeling about sharing one's knowledge"; subjective norms about knowledge sharing as "the degree of one's perceived social pressure from important others to share or not to share one's knowledge" ; and intention to share knowledge as "the degree of one's belief that one will engage in knowledge-sharing behavior" (Chow and Chan, 2008). Their data revealed that most social capital factors have a positive effect on attitude towards knowledge sharing and subjective norms about knowledge sharing. The exception is social trust, which is found to be ineffective on both attitude towards and subjective norms about knowledge sharing.

The above-mentioned studies examined the relationships between social capital dimensions and knowledge sharing with no concern about social context or communities. On the other hand, many studies attempted to investigate the relationships in a specific context. For example, Huysman and Wulf (2005) investigated the role of IT in support of knowledge sharing in communities based on social capital theory. The authors asserted that network technologies are useful to foster the extent of knowledge sharing when they are applied within a context of social network. They also stated that in terms of higher social capital in communities, there are more opportunities, abilities and motivations to use IT tools for knowledge-sharing purposes (Huysman and Wulf, 2005).

Building on the Nahapiet and Ghoshal (1998) model, Wasko and Faraj (2005) examined the effects of individual factors and social capital dimensions on the knowledge contribution in an electronic network of practice at an individual level. However, the authors use different measures for the dimensions; they used centrality for structural, commitment and reciprocity for relational and self-rated expertise and tenure in the field for cognitive dimensions (Wasko and Faraj, 2005). Their findings confirm a fully positive effect of the structural dimension and a partially positive effect of the cognitive dimension on knowledge contribution. However there is no support for the impact of the relational dimension on the knowledge contribution hypothesis.

Chiu et al. (2006) investigated the influence of social capital dimensions on knowledge sharing in virtual communities. They defined knowledge sharing in terms of quantity of knowledge sharing and knowledge quality. Social capital dimensions used in this study are structural dimension - interaction tie, relational - trust, norm of reciprocity and identification, and cognitive - shared language and shared vision. Based on their

analysis, the study confirmed the positive effects of interaction ties, reciprocity and identification on the quantity of knowledge sharing but not on knowledge quality. Trust and shared language showed no impact on the quantity of knowledge sharing, while shared vision had a negative influence. The findings also indicate that trust, shared language and shared vision exert a positive effect on knowledge quality (Chiu et al., 2006).

Zboralski (2009) introduced community leader, management support and community members' motivation as an antecedent of knowledge sharing in community of practice. Reviewing theoretical and empirical works on communities of practice, she identified four features of paramount importance for "good" interaction within a group of people: trust, cohesion, communication climate and interaction frequency. The author considers knowledge sharing to have two components; interaction frequency and knowledge quality. She hypothesized a direct impact of three antecedents on knowledge quality as well as an indirect effect through interaction frequency. Supportive results were obtained for all tested hypotheses except the effect of a member's motivation on knowledge quality (Zboralski, 2009).

Van den Hooff and Huysman (2009) also highlighted the importance of contextual features, but from another point of view. The authors claimed that social contexts have their own influence on knowledge sharing, independently and beyond management practice. They distinguished between two approaches of knowledge sharing – the emergent approach and the engineering approach. The emergent approach states that knowledge is not dependent on management intervention and social capital has the management power of knowledge. The authors described this approach as an emergent approach that emphasizes more the practice-based and social nature of knowledge

sharing. The engineering approach claims that knowledge is manageable, and management can influence the process of knowledge sharing by creating and stimulating such an environment (van den Hooff and Huysman, 2009).

They hypothesized that each engineering factor has a positive impact on each social capital dimension, and each social capital dimension positively affects knowledge sharing. The influence of the organizational structure on structural and cognitive social capital and ICT infrastructure on relational and cognitive dimensions were found to be non-significant (van den Hooff and Huysman, 2009). However, the findings verify that all three dimensions of emergent factors have a significant effect on the extent of knowledge sharing.

The van den Hooff and Huysman study (2009) highlights the possible moderating role of communities of practice, in which different levels of social capital can alter the impact of organizational practice on the extent of knowledge sharing.

The moderating role of social capital has been tested in a recent empirical study by Pérez-Luño et al. (2011). The authors examined the moderating role of social capital in the relationships between knowledge tacitness and knowledge complexity and radical innovation in 143 Spanish innovative firms. They asserted that radical innovation increased with the impact of knowledge tacitness especially when higher social capital was evident. On the contrary, when low levels of social capital were evident, knowledge tacitness reduced radical innovation. The result indicates that the interaction between social capital and knowledge complexity has no significant influence on radical innovation (Pérez-Luño et al., 2011).

2.10   Research Framework

The framework for this research results from relationships deduced from the review of literature. This framework proposes that the effect of organizational factors on knowledge sharing and knowledge sharing on the innovation capability of a firm are varied in terms of the level of social capital of community of practice. While most past studies investigated the direct effect of social capital on the extent of knowledge sharing and innovation, this study examines the moderating impact of social capital on the relationships between organizational factors, knowledge sharing and innovation capability. The research model of this study is shown in Figure 2.2.
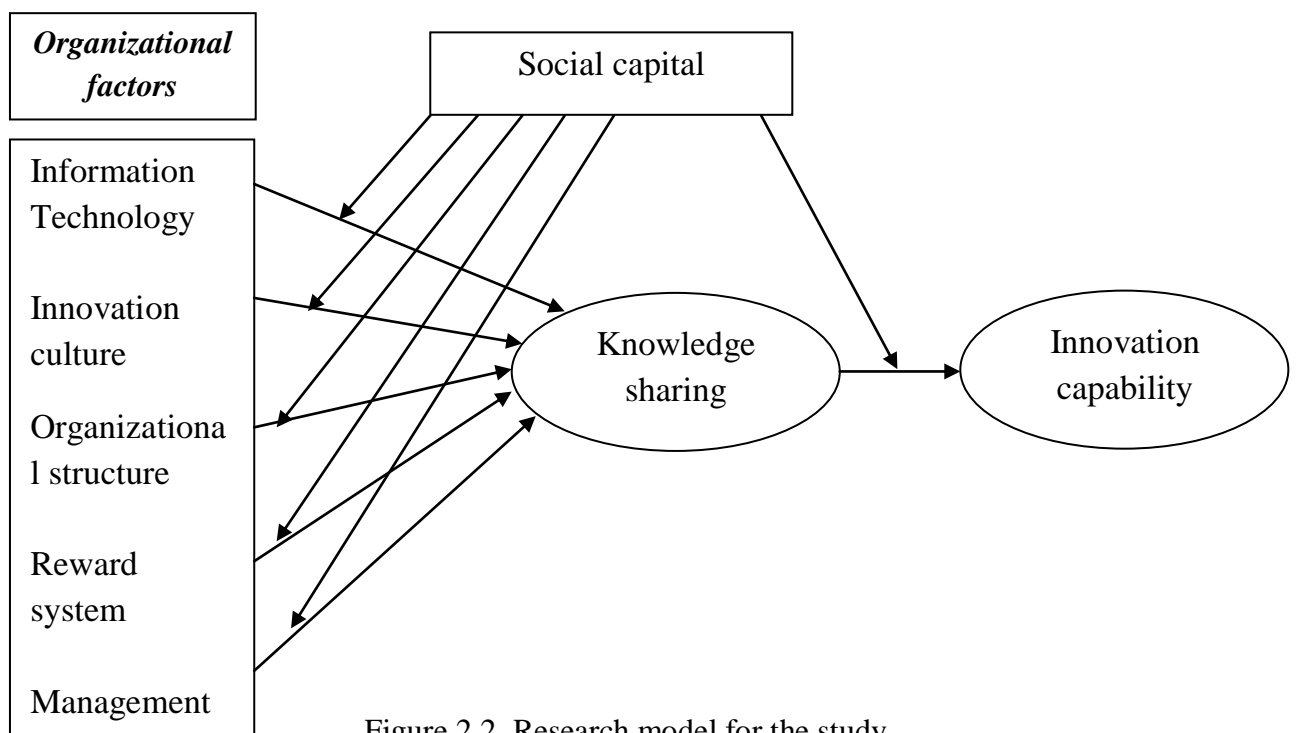
Figure 2.2. Research model for the study

2.11   Hypothesis Development

This section presents the research model developed based on previous literature, and discusses the development of the hypothesis for the relationship between predictors

(information technology, organizational culture, organizational structure, reward system, management support) and dependent variables (knowledge sharing and innovation capability). This section also explores the moderating effect of social capital of community of practice on the relationship between information technology, organizational culture, organizational structure, reward system and management support towards knowledge sharing.

The constructs in the research model taken into consideration are: (1) information technology, (2) innovation culture, (3) organizational structure, (4) reward system, (5) management support, (6) knowledge sharing, (7) innovation capability and (8) social capital. The moderating effects of social capital of community of practice are also considered in the research model for this study. The research model is developed to provide a comprehensive understanding of how knowledge sharing is facilitated by organizational enablers, and to what extent the level of social capital moderates the above-mentioned relationship.

2.11.1   IT Support and Knowledge Sharing

One of the most important knowledge management tools is information technology (IT) (McDermott, 1999; Alavi and Leidner, 1999). Initially, most knowledge management projects started off with huge investments in IT. However, despite these heavy investments, most KM initiatives failed (Swan et al., 2000; Mohamed et al., 2006). For knowledge sharing, IT is just a tool, and as such would be helpless in facilitating knowledge sharing unless properly used (Mohamed et al., 2006). In reality, information technology is an enabler for knowledge sharing. It helps

individuals by facilitating rapid search, access and sharing of information as well as supporting communication and collaboration with co-workers (Lin, 2007). Moreover, effective knowledge sharing requires using IT tools in many cases to overcome time and location issues (Yeh et al., 2006; van den Hooff et al., 2004). Thus, information technology supports knowledge sharing when it is provided by the organization for its employees.

Hypothesis 1a. Providing IT tools for employees will enhance the extent of knowledge sharing between them.

Tacit knowledge to be shared might need more than IT tools alone. As stated by Mohamed et al. (2006), "IT has to be part of a balanced and integrated set of components" (p. 105). An integrative approach, which includes both social and IT-based approaches, has shown a more effective role in knowledge sharing and innovation, as this is more capable of tacit knowledge sharing (Chanal & Kimble, 2010; Swan et al., 2000). As an interactive process an innovation process requires more communication, and therefore a community model of interaction would be much more effective for knowledge sharing in innovation (Swan et al., 2000).

When the focus of knowledge sharing comes within the context of communities of practice, IT-based approaches can also be supportive of tacit knowledge sharing. Indeed, IT tools might be more helpful to build a knowledge-sharing network or community (Alavi & Leidner, 2001) as well as providing more possibilities for sharing more novel knowledge.

According to Hislop (2002), IT systems may also play a useful role in tacit knowledge sharing when common knowledge and trust between members of communities of

practice exist. Hislop (2002) believes that a community of practice has a significant level of common knowledge among community members. The common knowledge exists because members are connected and highly interactive. Members are close and familiar with each other. The existence of more connections, interactions and closeness of community members is reflective of a higher level of structural dimension of social capital. This inadvertently may drive members of community of practice to rely on IT tools to share their common knowledge. Thus, we hypothesize that:

> **Hypothesis 1b.** The higher level of structural dimension of social capital within communities of practice, the greater the impact of IT support on knowledge sharing.

2.11.2   Innovation Culture and Knowledge Sharing

In general, organizational culture has been investigated in both KM and innovation literature (Al-Alawi et al., 2007; Dobni, 2008; Martins & Terblanche, 2003; Yang, 2007). In essence, for any organization to be innovative, the organizational culture must be capable of enhancing knowledge sharing (Lemon & Sahota, 2004), as well as innovation capability (Dobni, 2008; Martins & Terblanche, 2003) concurrently. Several studies in the KM and innovation literature focus on the need to establish the right kind of organizational culture (Ahmed, 1998; Egbu, 2004; Martins & Terblanche, 2003).

This notion is further supported by Dobni (2008), who asserts that changing an organization's focus to innovation requires a change in the organization's general cultural orientation towards innovation. An innovation culture which has four

dimensions – innovation intention, innovation infrastructure, innovation influence and innovation implementation – is more able to enhance knowledge sharing towards innovation capability (Bastič & Nekrep, 2009; Dobni, 2008; Matthew & Brunetto, 2011). This claim will be discussed further. Innovation intention and infrastructure are management-centric dimensions while innovation influence and implementation are employee-centric dimensions. As this study intends to explore the perceptions of employees about the management role in establishing innovative culture and its impact on knowledge sharing, the management-centric dimensions of Dobni's (2008) innovation culture construct will be used to represent organizational innovative culture.

Innovation intention reflects the strength of an organization's propensity for innovation (Cañibano et al., 2006), and how well employees contribute towards innovation (Dobni, 2008). In order to have the intention to innovate, a proper organizational constituency as well as innovation propensity in vision and goals is required.

Organizational constituency is defined as "the level to which employees are engaged in the innovation and how employees think of themselves in relation to their colleagues in respect to value, equity, and contributions made within the organization" (Dobni, 2008). In a way, it refers to employees feeling valued, treated fairly and able to contribute to configuring an organization's constituency. Thus, employees and colleagues become more aware of their role and actual position within the organizational constituency. In terms of a proper organizational constituency, everyone is aware of his or her role and contribution towards innovation. They are more enabled to generate new ideas and challenge management

decisions, expect to be treated as equals, and expect honest communication in an open environment which is collaborative, challenging and encouraging (Dobni, 2006; Fischer et al., 2004). All these will help increase the chance of knowledge and expertise sharing between colleagues and co-workers.

Having innovation propensity and embedding it in the organizational vision and goals is another dimension of innovation intention. When innovation is embedded in the organizational vision and goals, innovation is seen as a core value and culture by employees, driving them to seek more opportunities through sharing experiences and knowledge (Dobni, 2006), and eventually to be more innovative. Fundamentally, the knowledge-sharing goal is better achieved if there is a clear connection between organizational vision, innovation and overall company goals (Riege, 2005). Hence, we posit that:

> **Hypothesis 2a.** Greater innovation intention will result in a greater extent of knowledge sharing.

The effect of innovation intention on knowledge sharing can be altered within the context of communities of practice. According to Fischer et al. (2004), in a highly collaborative work or project environment (higher level of closeness, interaction and accessibility within organizations or communities), members are more aware of others' capabilities. The proper distribution of roles (organizational constituency) within a community will facilitate knowledge and expertise sharing as everyone knows who is the expert in specific areas. This will enable them to generate and disclose their new ideas, challenge others and management decisions and consequently raise the intention to innovate.

It is the same story for innovation propensity in vision and goals. An innovation vision is better understood by community members when there is closeness and intensified interaction between members of communities of practice. According to Chiu et al. (2006) and Tsai and Ghoshal (1998), a shared vision – in this case the organizational vision of innovation – means organization members are more likely to exchange resources and knowledge as they see each other as partners. In summary, there intent for innovation in communities of practice is more likely when members are well connected. Therefore, it can be hypothesized that:

> **Hypothesis 2b.** The impact of innovation intention on knowledge sharing is enhanced when the community of practice has a greater structural dimension of social capital.

Beyond having serious intention for innovation, an organizational culture must also provide a proper infrastructure for innovation to promote knowledge sharing and innovation. This infrastructure is not limited to but includes employee creativity and empowerment (Martins and Terblanche, 2003) and organizational learning (Dobni, 2008). To present an appropriate innovation culture in an organizational context, firms need to ensure their employees are motivated for continuous learning and prepared with significant empowerment.

Organizational learning is "the degree to which training and educational opportunities of employees are aligned with innovation objectives" (Dobni, 2008). Through organizational learning, employees must be encouraged to develop new skills and capabilities. Organizational culture which supports and encourages continuous learning should observe greater knowledge sharing as employees need to keep their knowledge

up to date (Martins and Terblanche, 2003). Learning generally promotes and encourages knowledge sharing (Alavi et al., 2006) .

In addition to learning, employees must be empowered and creative to play a role in innovation. Empowerment and creativity are fundamental elements for an organizational culture with an innovation focus (Martins & Terblanche, 2003). Empowerment promotes information and knowledge sharing (Dobni, 2006). Empowered employees feel autonomy and are more ready to offer their opinions and share their capability, skills and knowledge regarding innovation implementation. Supporting and encouraging employees to be more creative is another important aspect of an organizational innovation infrastructure necessary for an innovation culture. The quest towards increased creativity will encourage individuals to get involved with more people and share knowledge. Providing a finer innovation infrastructure should result in more knowledge sharing as it encourages empowered employees who are more motivated to learn and be creative.

Hypothesis 3a. The availability of innovation infrastructure will result in a greater extent of knowledge sharing.

Creativity can be cultivated more from interaction and collaboration with other individuals and their network ties (Fischer et al., 2004) . Similarly, empowerment can be enhanced through open communication and network building (Velthouse, 1990). In addition, learning inspiration is stronger in the context of communities of practice (Huysman and Wulf, 2004; Wenger, 1998). It is assumed that members in a community of practice learn more and faster because they have greater access to available knowledge and expertise of community members through interaction and connection

with each other (Brown and Duguid, 1991). Members of communities of practice express their opinions and ideas to others more comfortably, as mistakes and risk taking are more tolerated among community members with close interactions (Johnson, 2001). One might say, the higher the structural social capital within a community of practice, the greater the extent to which members feel empowered and encouraged for learning, creativity and knowledge sharing (Huysman and Wulf, 2004).

Hypothesis 3b. A greater extent of structural dimension of social capital of community of practice will enhance the impact of innovation infrastructure on knowledge sharing.

2.11.3 Organizational Structure and Knowledge Sharing

Traditional and hierarchical models of organizational structure are less effective in enhancing organizational knowledge sharing (Rhodes et al., 2008; Syed-Ikhsan & Rowland, 2004). Centralization and organizational hierarchy have been cited as a main knowledge-sharing barrier (Ardichvili et al., 2003; Serenko et al., 2007). Tsai (2002) argues that centralization and hierarchy unintentionally prevent knowledge flow and knowledge provision to other units and departments in organizations as these may not be formally authorized by management. In a more hierarchical structure, communication functions would be "top down", and speed of information and knowledge flow gradual (Syed-Ikhsan & Rowland, 2004).

To facilitate efficient knowledge sharing, know-how should be allowed to flow through firms more easily and smoothly (Al-Alawi et al., 2007; Tsai, 2002). This will allow employees to participate in decision making more actively and spontaneously. Hence, it

is crucial for organizations to adopt a flexible structure in order to encourage collaboration and knowledge sharing across organizational boundaries. Otherwise, according to Lee and Choi (2003), there would be a trade-off between the optimization of knowledge sharing within a firm *per se* and its department. Knowledge sharing would be sub-optimized in the absence of a flexible organizational structure. Fundamentally, a hierarchical structure should be avoided to ensure optimized knowledge sharing throughout the firm. We can thus hypothesize that:

> **Hypothesis 4a.** A flexible organizational structure will enhance the extent of knowledge sharing among employees.

Communities of practice are a mechanism that can potentially help reduce the impact of hierarchical culture and enhance the effect of a flexible culture. Communities of practice can facilitate collaboration and knowledge sharing across organizational boundaries as they are not limited to divisions, or even to organizations. In fact, communities of practice can enhance organizational structure flexibility as they are structured in a way that widens the pattern of connections and interactions among members. Connection, interaction and closeness of community of practice members link individuals' knowledge and stream the information and expertise among them regardless of their organizational position. This would allow them to share knowledge and be more participative in decision making regardless of their position. Hence, we posit that:

> **Hypothesis 4b.** A higher level of structural dimension of social capital of communities of practice will enhance the impact of flexible organizational structure on knowledge sharing.

2.11.4   Reward System and Knowledge Sharing

Sharing of knowledge has always been concurrent with benefits and costs. As knowledge is posited as power, the economic exchange theory suggests that there must be more benefits over costs to encourage individuals to share this power (Bock and Kim, 2002). This fact has encouraged organizational leadership and management to provide incentives and rewards to encourage employees to share their knowledge (Cabrera and Cabrera, 2005; Lin, 2007; Mohd Nor and Egbu, 2009). While knowledge sharing happens at various organizational levels, firms need to have reward systems for all levels. According to Bartol and Srivastava (2002), the reward for knowledge sharing can be at individual, team and even work unit levels, and can also be designed in various forms; monetary or non-monetary and intrinsic or extrinsic. In a nutshell, a fair reward system is necessary to encourage knowledge sharing. Therefore, the following hypothesis is presented:

Hypothesis 5a. The practice of rewarding employees for knowledge sharing by the organization will enhance the extent of knowledge sharing.

Rewarding knowledge sharing behaviour is easier said than done. The economic exchange theory has not been able to explain knowledge-sharing behaviour in communities of practice and informal contexts. In such contexts, knowledge sharing happens through social interaction and is therefore difficult to evaluate. Knowledge-sharing motivation in communities of practice can be explained by the social exchange theory. According to this theory, one offers help without negotiation of terms and with no knowledge of whether and when the recipient will return the favor (Bartol and Srivastava, 2002; Bock and Kim, 2002). According to Bartol and Srivastava (2002),

trust and citizenship among members of communities of practice facilitates knowledge-sharing behaviour. Based on Bock and Kim (2002) research study, obligation is another function of knowledge sharing in the context of community of practice that will make the reward impact ineffective on knowledge sharing. Similarly, Bock et al. (2005b) believe that when individuals influence each other within a social and organizational context by knowledge exchange, their social exchanges are a major determinant of knowledge sharing.

In communities of practice, there is mutual expectation that a newcomer who asks for help is obligated to return the favor later without expecting any reward. Basically, when the relational capital is high among members of the community of practice, reward will most probably lose its impact on knowledge sharing. People are more willing to share on the basis of the relationship and have no expectation of being rewarded for sharing knowledge. Therefore, we can hypothesize that:

> **Hypothesis 5b.** A greater extent of relational dimension of social capital of community of practice will reduce the impact of the organizational reward system on knowledge sharing.

2.11.5   Management Support and Knowledge Sharing

Management support is cited as one of the most important and effective knowledge-sharing enablers (Wee, 2012a; Lin, 2007). Organizational management and leadership can act and support knowledge sharing in various ways, which includes providing resources (Davenport et al., 1998), and speaking positively about knowledge sharing and increasing awareness of knowledge sharing among subordinates (Zboralski,

2009). It is empirically held that employees' perception of top management support towards knowledge sharing helps increase knowledge sharing among individuals in organizations (Lin, 2007; Erhardt, 2003; Wang and Noe, 2010). Hence, we hypothesize that:

> **Hypothesis 6a.** Management support for knowledge sharing will enhance the extent of knowledge sharing among employees.

Although we acknowledge the fact that management support plays an important role in promoting knowledge sharing, we suggest that the influence of management support may be significantly different in communities of practice. Communities of practice with characteristics such as connectivity, closeness, and interaction (structural dimension) reduce the need for support and encouragement (Lee et al., 2005; Carmona-Lavado et al., 2010).

We can claim that management support for knowledge can enhance the extent of knowledge sharing if the structural dimension of social capital is low. When strong ties and closeness exist among members of the community of practice, there is group support, which encourages open sharing among them (Wasko and Faraj, 2005; Chiu et al., 2006), rendering management support redundant. Therefore, we argue that management support for knowledge sharing will not be effective while the structural dimension of social capital of communities of practice is high.

> **Hypothesis 6b.** A greater extent of structural dimension of social capital of community of practice will reduce the impact of management support on knowledge sharing.

2.11.6 Knowledge Sharing and Innovation Capability

Innovation capability is identified as the most important organizational capability (Lin, 2007; Liao et al., 2007b; Zhi-hong et al., 2008). As innovation is derived using knowledge, innovation and knowledge are closely related (Liao et al., 2007b). Knowledge creation and innovation are highly dependent on the extent of knowledge sharing between individuals within an organization (Ipe, 2003; Nonaka and Takeuchi, 2007; Mohd Nor and Egbu, 2009).

According to van den Hooff and van Weenen (2004) and Lin (2007), knowledge-sharing processes consist of knowledge donating and knowledge collecting. Knowledge donating refers to how individuals contribute to groups, community and organizational knowledge when they learn or acquire a new knowledge. Knowledge collecting refers to the processes and mechanisms of gathering information and knowledge from internal and external sources.

The contribution of individual knowledge to collective knowledge helps a firm to be innovative by generating new ideas and developing more business opportunities (Lin, 2007; Darroch and McNaughton, 2002). Similarly, gathering new knowledge helps to stimulate innovative thinking and generate ideas that are not easily imitated (Lin, 2007). The higher the knowledge donating and knowledge collecting in an organization, the higher the total amount of knowledge. A greater amount of knowledge increases the chance of higher innovation capability when properly applied. Therefore, we claim that more knowledge sharing (donating and collecting) will result in higher innovation capability:

Hypothesis 7a. Employees' knowledge sharing enhances exploratory innovation.

Hypothesis 7b. Employees' knowledge sharing enhances exploitative innovation.

2.11.7 Social Capital, Knowledge Sharing and Innovation Capability

We posit that the relationship of knowledge sharing and innovation capability is enhanced by strong social capital. Clearly, past research indicates that knowledge sharing facilitates innovative behaviour. As communities of practice and their social capital play a remarkable role in influencing innovation capability (Lesser & Storck, 2001; Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998; Zheng, 2010), this study intends to explore the possible moderating effect of social capital of communities of practice on the relationship between knowledge sharing and innovation capability. However, only the cognitive dimension of social capital is considered due to such reasons. According to Zheng (2010), a limited number of studies has focused on the relationship between cognitive dimension and innovation. Most past studies focused on the structural and relational dimensions of social capital. The reason for excluding the cognitive dimension in most studies remains unclear. However, it seems that the cognitive dimension failed to affect innovation when it was examined together with the relational dimension (Zheng, 2010).

This study proposes that the cognitive dimension of social capital plays an important role in enhancing innovation through greater knowledge sharing, and should not be ignored. Creating new knowledge and innovation requires individuals to exchange,

combine and share different resources. These processes can be enhanced when a strong cognitive dimension of social capital is in place. The cognitive dimension refers to those resources providing shared representations, interpretations and systems of meaning among parties. According to Nahapiet and Ghoshal (1998), a shared language can influence the conditions for knowledge combination and exchange in several ways. First, social relations are driven through language as this is the way people communicate and discuss. When a language is less common, there will be a communication breakdown and people will be kept apart (Chiu et al., 2006). Sharing a more common language, therefore, increases the chances of gaining access to more information and people.

The second reason that emphasizes the influence of shared language is that people put aside knowledge obtained from discussion and refrain from sharing when it does not fit their language. In other words, the absence of a shared language reduces sharing as people are unable to relate to each other (Chiu et al., 2006). Third, language helps to enhance the combination capability of knowledge. Knowledge can be advanced and created through narratives of the new concepts (Nonaka & Takeuchi, 2007). Shared language and vocabularies enhance information combination capability (Boland & Tenkasi, 1995).

In addition to shared language, researchers suggested stories, myths and narratives also play a significant role for meaning creation and knowledge exchange (Nahapiet & Ghoshal, 1998). Narratives and stories facilitate the exchange of practices and experiences between knowledge sharers, which enable them to develop new and improved experience. Nahapiet and Ghoshal (1998) concluded that "the emergence of shared narratives within a community thus enables the creation and transfer of new

interpretations of events, doing so in a way that facilitates the combination of different forms of knowledge, including those largely tacit" (Nahapiet & Ghoshal, 1998, p. 254).

Hence, we hypothesize that:

Hypothesis 8a. A higher extent of shared language among community members will enhance the impact of knowledge sharing on exploratory innovation.

Hypothesis 8b. A higher extent of shared language among community members will enhance the impact of knowledge sharing on exploitative innovation.

Hypothesis 8c. The increased use of stories and narrative among community members will enhance the impact of knowledge sharing on exploratory innovation.

Hypothesis 8d. The increased use of stories and narrative among community members will enhance the impact of knowledge sharing on exploitative innovation.

2.12   Chapter Summary

This chapter reviewed and discussed findings of prior studies on knowledge sharing. The chapter began by reviewing theories relevant to this study, looking at the relationship between knowledge sharing and its organizational enablers. Subsequent sections addressed innovation and social capital and communities of practice from knowledge management and innovation perspectives. Finally, the chapter ended with a proposed research model based on the insights gained through a literature review of

knowledge sharing, innovation capability and social capital, followed by the development of hypotheses.

CHAPTER THREE – RESEARCH METHODOLOGY AND DESIGN

3.1 Introduction

This chapter discusses the research method, research design, development and the operation of measures. It also discusses the outcomes of the pilot test – reliability and validity, population and sample size and data collection. The chapter concludes with an introduction to the data analysis approach and chapter summary.

3.2 Overview of the Research Design and Process

3.2.1 Research Paradigm

The research design is the first step of a research study to gather essential data that will then be analyzed to arrive at possible solutions. Research design involves a series of rational decision-making choices associated with the purpose of the study; where the study will be conducted, the type of study, the unit of analysis, time horizon, the extent to which the researcher manipulates and controls the study, the data collection process and how variables will be measured and finally, the data analysis (Sekaran, 2006; Saunders et al., 2009).

Paradigm and philosophical assumptions attract the scholar's attention in recent decades in undertaking research (Gephart, 1999). A paradigm is "a way of examining social phenomena from which particular understandings of these phenomena can be gained, and explanations attempted" (Saunders et al., 2007 p. 112). The most important thing for a researcher undertaking research is to reflect his or her fundamental beliefs regarding the nature of the world in which they live, and how they perceive it. The way a researcher views the world will have a tremendous impact on the way they view their

subjects, environment and data collection techniques, and the manner in which results are interpreted (Saunders et al., 2009).

A research paradigm can be categorized mainly on ontological and epistemological assumptions. An ontological assumption is related to a researcher's view of the social and technical world, while an epistemological assumption relates to knowledge and knowledge acquisition (Hirschheim and Klein, 1989).

An epistemological assumption can be objective or subjective (positivism and interpretivism). However, when researchers assume that all aspects of reality can be fully described and measured by observed-independent instruments, they have an objective view of reality. This view treats the social world as if it is the natural world (Saunders et al., 2009). The subjective view proposes that every person has a unique view on the world which can be only partially communicated or extracted (Alexander, 2002). Positivism assumption is objective and presumes that an objective world through scientific methods can be represented and measured by predicting and explaining causal relationships or association among variables (Gephart, 1999).

All research is based on underlying assumptions about what constitutes valid research and which methods are appropriate. This study attempts to explain how things work and focuses on the verification of the hypotheses based on the integrative model developed in chapter two. Due to the nature of hypothesis testing for this study, a positivist approach is deemed appropriate to understand how to obtain the required knowledge, enhance understanding about the relationships that exist between independent and dependent variables, and in turn provide significant outcomes. As such, this study takes the refinement of the positivism philosophy to investigate the

empirically complex range of social and organizational factors. The positivist approach for this study is consistent with the view of contemporary research within the field of KM (Dwivedi et al., 2011; Iqbal and Mahmood, 2012).

3.2.2 Research Method

The selection of a research method for carrying out a specific research project is important to the success of the project (Saunders et al., 2009). Such a methodology can guide the conduct of the research and affect the quality of research results. However, selecting an appropriate methodology for the research is not a simple task due to the availability of numerous methods, techniques and procedures, and the specific nature of the research project (Adams et al., 2007; Saunders et al., 2009) .

Two approaches commonly used in research are the deductive and the inductive approaches (Collis et al., 2003; Saunders et al., 2009). With the use of the deductive approach, a theory is developed or tested, and hypotheses are proposed. The objective of research using this approach is to design a research strategy to test the hypotheses. This study aims primarily to test the research framework and hypotheses as outlined in the previous chapters. As a result, the deductive approach is appropriate. Quantitative research methods emphasize quantification in the collection and analysis of data. Such methods usually involve the use of statistical analysis in order to draw meaningful conclusions from the research (Adams et al., 2007).

This study focuses mainly on the moderating role of social capital in the relationships of knowledge-sharing enablers, knowledge sharing and innovation capability. Even though many studies use these KS enablers, there are few well-established models or

frameworks to explain the moderating role of social capital influence on knowledge sharing and innovation capability.

The discussion above suggests a survey is appropriate for this study within the constraints of the time and resources available. A survey is a quantitative method that can collect a large amount of data from a sizeable population in a highly economical way and cater for the 'what?' questions (Saunders et al., 2009). The major strengths of the survey include its versatility, its efficiency and its economy.

However, a survey has its limitations. The major weakness of adopting such a method is that the quality of information secured depends heavily on the ability and willingness of respondents to cooperate. It also requires much time spent in designing and piloting the questionnaire and analyzing the results (Saunders et al., 2009). To minimize these limitations and to ensure the reliability and validity of the research findings, the survey instrument, data collection and analysis should be carefully designed and conducted (Collis et al., 2003). This includes survey questionnaire design, the criteria for and selection of targeted respondents, the conduct of a pilot test, data collection and data analysis. Subsequent sections will discuss the design of the present study.

3.3 Variable Definition

The review of the literature from three perspectives, knowledge sharing, social capital and innovation, as discussed in chapter two, facilitates the development of a research model with specific variables. Table 3.1 below indicates the variables used in the model along with their operational definition.

Table 3.1: Variable definition

Variable		Construct	Operational Definition	References
IT		IT Support	The degree of IT support for collaborative works, for communication, for searching, sharing and accessing, presence and usage of various tools, and efficiency for knowledge sharing.	(Lee and Choi, 2003; Al-Alawi et al., 2007)
Innovation culture	Innovation intention	Organizational constituency	The level to which employees are engaged in innovation and how employees think of themselves in relation to their colleagues in respects to value, equity, and contributions made within the organization.	(Dobni, 2008)
		Innovation propensity in vision and goals	The degree to which the organization has a formally established – within their business model - architecture to develop and sustain innovation. This would be communicated through vision, goals, objectives and operationalized through the business model and business processes.	
	Innovation infrastructure	Organizational learning	The degree to which training and educational opportunities of employees are aligned with innovation objectives.	(Dobni, 2008)
		Employee creativity and empowerment	Determination of the creative capacity of employees and the amount of the creativity that employees are allowed to express	

			in their work. It also assesses the degree of empowerment held by employees, and the ability of employees to improve and enact at will.	
Organizational structure	Flexibility		The level of employee participation in decision-making ,easy of information flow , cross-functional teams for certain tasks	(Al-Alawi et al., 2007)
Reward system	Reward for knowledge sharing		The degree of existence of rewards for knowledge sharing formally and informally, influence of knowledge sharing rewards	(Gold et al., 2001; Al-Alawi et al., 2007; Lin, 2007)
Management support	Management support for knowledge sharing		The degree of management awareness of knowledge sharing importance. Express support, encouragement and resource providing for knowledge sharing by management.	(Lin, 2007)
Knowledge sharing	Knowledge donating Knowledge collecting		The degree of employee willingness to contribute knowledge to colleagues. Referred to process of consulting colleagues to encourage them to share their intellectual capital.	(Lin, 2007)
Innovation capability	Exploratory innovation Exploitative innovation		Refers to organization's effort in perusing new knowledge and developing new products and services from emerging markets Refers to organization's effort in improving and extending existing products and services and from	(Jansen et al., 2006a)

Social capital	Structural	existing customers	
		The strength of relationships between the individual and the other members of the community, where strong ties are close and frequent, and weak ties are distant and infrequent , and the extent to which the relationships formed in one social setting are transferred to another setting.	(Nahapiet and Ghoshal, 1998; Muhammed, 2006)
	Relational	The extent to which a socially defined right to control an action is held not by the actor but by community, the level of belief among the community members that other's intended action will be appropriate for them, the process whereby individuals see themselves as one with another person or the community, and the extent individuals maintain a commitment or duty to undertake an activity in the future. It acts as a credit slip for community member's contributions.	
	Cognitive	The extent of shared languages and codes that existed in the community, and the extent the community used shared narratives	

Figure 3.1 below depicts the research model with operational dimensions to be tested through the testing of hypotheses.
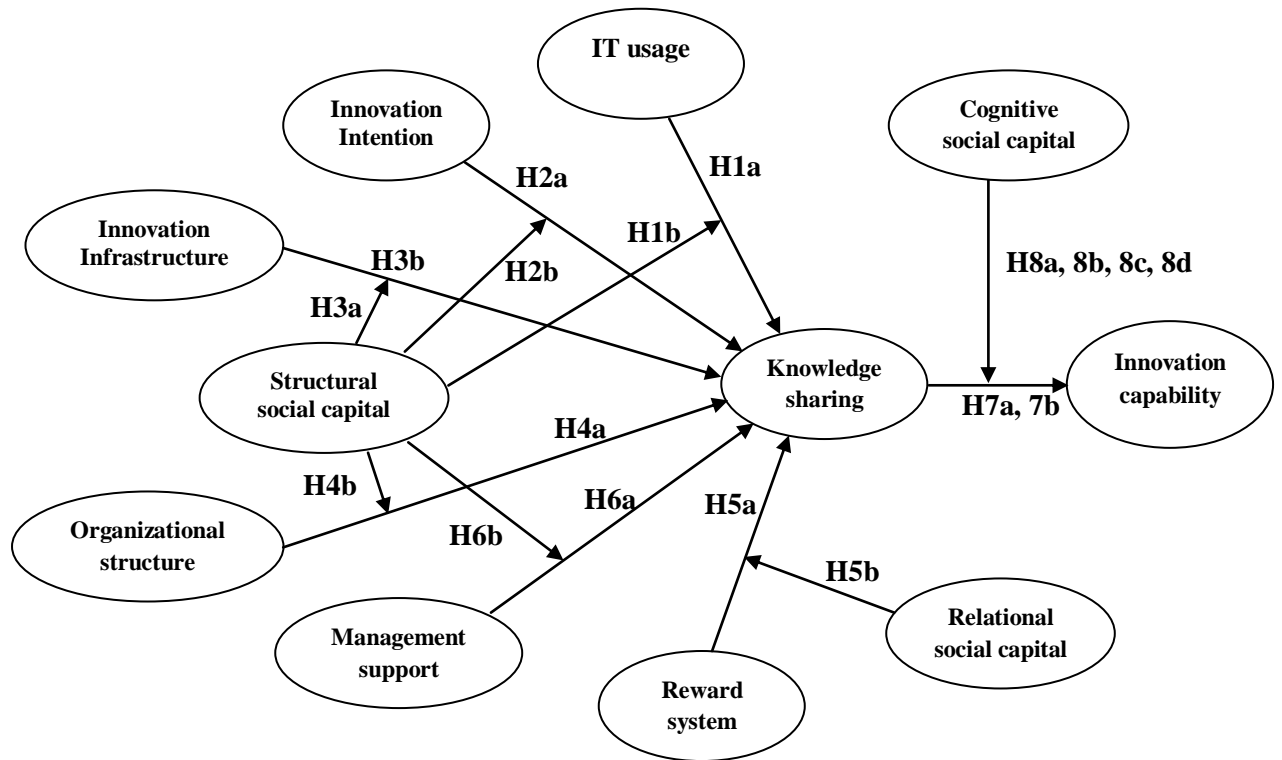
Figure 3.1. Research Framework

3.4 Survey Development

The survey questionnaire developed in this study uses items adapted from the previous study, as shown in Table 3.2. All items are measured using a five-point Likert-type scale (ranging from 1 = strongly disagree to 5 = strongly agree). The measurement for each theoretical construct and the number of items in the model is described briefly below in Table.3.2. The initial set of the questionnaire is displayed in Appendix A1.

Table 3.2: Measurements references

Variable	Constructs	Dimensions	Items	References
Information Technology	IT Support		4items	(Lee and Choi, 2003) (Al-Alawi et al. , 2007)

Innovation Culture	Innovation Intention	-Organizational constituency	7 items	(Dobni ,2008)
		-Innovation propensity	6 items	
	Innovation Infrastructure	-Organizational learning	5 items	
		-Employee creativity & empowerment	4 items	
Organizational Structure	Flexibility		7 items	(Al-Alawi et al., 2007)
Reward System	Rewards for knowledge sharing		6 items	(Gold et al., 2001; Al-Alawi et al., 2007; Lin, 2007)
Management support	Management support for KS		7 items	(Lin, 2007)
Knowledge Sharing	Knowledge donating		3 items	(van den Hooff and De Ridder, 2004a; Liao et al., 2007a)
	Knowledge collecting		4 items	
Innovation Capability	Exploratory		5 items	(Jansen et al., 2006a)
	Exploitative		5 items	
Social Capital of Communities of Practice	Structural	-Network tie & network configuration	7 items	(Muhammed, 2006)
	Relational	-Shared Norms, mutual trust, identification, and obligation	13 items	
		-Shared languages	4	

	Cognitive	-Shared narratives,	items 4 items	

3.5 Pretesting the Measures

Initially, the English version of the survey was sent to a panel of academics, consisting of six senior academics from relevant backgrounds to establish the content validity of the constructs. The panel was selected based on their familiarity with the research area and the constructs to be examined. Out of six academics, three responded. Based on their judgments, some items were deleted, some words were changed and some sentences re-phrased to make them more understandable and representative of the constructs.

As the final version was to be distributed to respondents in Iranian companies, the survey had to be translated to the local language of Persian. A back translation approach was used to ensure content validity for translated items. Initially, the questionnaire was translated from English to Persian by a fluent bilingual academic with a management and business background. Then the translated version was translated back to English by another independent bilingual academic expert. Finally, both original and translated English versions were compared, and the necessary amendments made by one bilingual academic expert and three practitioners to ensure the content validity of the translated survey items.

3.6 Pilot Study

After the suggested modifications, a pilot test was conducted with a total of 70 target respondents from various related industries with a minimum two years of work experience. In total, 61 respondents, including 11 top managers, 28 middle-level managers and 22 from other levels, including a technician, and project managers from research and development departments, completed and returned the survey forms.

According to Saunders et al. (2009), the purpose of a pilot test is to refine the questionnaire so that respondents have no problems answering the questions, and there will be no problems recording the data. In addition, a pilot test enables the obtaining of some assessment of the questions' validity and the likely reliability of the data collected (Saunders et al., 2009, p. 394). Based on Saunders et al.'s argument, and using SPSS software, the author conducted the related tests for the pilot data and refined the questionnaire accordingly, as presented in the following section.

3.6.1 Reliability

The reliability of a measure refers to the measure's ability to detect the true score rather than measurement error (Adams et al., 2007). Coefficient alpha (Cronbach, 1951) is by far the most widely used estimate of internal consistency (composite or construct reliability) in the literature (Cortina, 1993).

As a general guideline, the reliability estimate of 0.70 is suggested to be acceptable (Nunnally and Bernstein, 1994), and estimates of above 0.80 and 0.90 are considered good and excellent respectively (Bagozzi et al., 1991). However, for the initial stages of

research or for exploratory purposes, reliability of 0.60 or 0.50 are also acceptable (Nunnally and Bernstein, 1994).

Table 3.3: Constructs' items and Cronbach's Alpha

Variable	Constructs	Dimensions	Cronbach Alpha After pilot	No of items
IT			0.810	4 items
Innovation Culture	Innovation Intention	Organizational constituency	0.784	5 items
		Innovation propensity	0.805	5 items
	Innovation Infrastructure	Organizational learning	0.719	4 items
		Employee creativity & empowerment	0.756	4 items
Organizational Structure			0.920	4 items
Reward System			0.726	5 items
Management support			0.893	4 items
Knowledge Sharing			0.740	7 items
Innovation Capability	Exploratory		0.844	5 items
	Exploitative		0.883	5 items
Social Capital of Communities of Practice	Structural		0.706	6 items
	Relational		0.895	13 items
	Cognitive	Shared languages	0.719	4 items
		Shared narratives	0.947	4 items

To eliminate an item from a construct with low reliability (less than 0.60) two criteria are considered concurrently. First, if the item is deleted, the total Cronbach Alpha of the construct should improve significantly. Second, the item's corrected item-total correlation (CITC) value should be lower than 0.30 (Pallant, 2010). Using the above mentioned criteria, 12 items from various constructs were removed. Table 3.3 indicates the number of items for each construct after the pilot study purification. The refined and final questionnaire is displayed in Appendix A2.

3.7 Unit of Analysis

The current research was conducted on a multi-level approach as it aimed to examine the impact of organizational enablers of knowledge sharing between individuals on innovation capability at an organizational level. This multilevel perspective allowed the researcher to address the complexity of relationships between variables (Dixon and Cunningham, 2006). Additionally, to deal with potential problems associated with single-informant bias and common-method bias, we separated the measurement of independent and dependent variables and collected data from two different levels of organizational hierarchy; dependent variable questions were distributed to and answered by top senior managers (CEO, deputy or members of the board), while independent, moderator and intervening variable items were distributed to and answered by middle-level managers from research and development (R & D). However, this department has a different name in various service industries in Iran, such as systems and methods in banking, planning and development in leasing, and research and training in insurance industries.

In a nutshell, the dependent variable in this study examines the innovation capability of a firm. The variable is measured at the organization level. Therefore, the unit of analysis in this study is organization. However, despite the organizational level of analysis, the data will be collected from an individual level for middle managers' questions and thus it must be converted to the organizational level through aggregation. Initially, an agreement test and then data aggregation were used to transform the level of analysis from a lower level to a higher level (James et al., 1983).

3.8 Population and Sample Size

Two criteria were considered when identifying the population of the study; the knowledge-intensity and innovation-orientation of a firm. A knowledge-intensive firm (KIF) in research literature is described as a firm in which knowledge is a paramount component and has more significance than other inputs. In simple words, knowledge plays a central role in a KIF's constitution (Rylander and Peppard, 2005).

In the study's context, pharmaceutical and financial institutions fit the description of KIFs (comparative to other industries). The characteristics of firms within these two knowledge-intensive industries have been discussed in chapter 1. Thus, these industries have been targeted as the population for this study. Financial knowledge-intensive firms are service-based firms, which include banking, insurance and investment and leasing companies, while pharmaceuticals are manufacturing types of KIF in this study. The selected industries are also of interest regarding innovation orientation – in both exploratory and exploitative innovation (Jansen et al., 2006b; Droege et al., 2009) . An exploratory innovation is addressed by a totally new product for the manufacturing sector (pharmaceutical), or a new product/service for the service sector (financial

firms). Exploitative innovation is addressed while there are some improvements over existing products, services and/or processes (Jansen, 2005).

The total population for the survey was 167 firms, all of which are registered on the Tehran stock market and the Over-the-Counter market, and included 42 banks and financial institutions, 26 insurance companies, 38 pharmaceutical manufacturers, 40 investment group companies and 21 leasing companies.

3.9 Data Collection

After instrument purification and refinement based on the pilot responses and the opinion of the experts, the questionnaire was finalized for the large-scale study. The questionnaires were distributed in two ways. For financial institutions, a personal distribution was conducted through a snowballing approach. Snowballing was selected because the current study aims to measure knowledge sharing and social capital in the community context. The appropriate departments were identified through on-site visits. The first respondent from middle management was requested to distribute the survey to four other respondents in his/her community of practice. To reach top managers, the author targeted the head of related departments as the first top manager. The second top managers were approached by visiting managing directors or their deputies and/or the board of directors' office.

However, this approach was not feasible in pharmaceutical firms as direct access to research and development department were more difficult. For these firms, the questionnaires were mailed through the Tehran stock market's research and publication division. The questionnaires for the five middle managers and the top manager's

questionnaire were sent to a senior person (such as head of department) in the R&D department, and another top manager's questionnaire was sent to the managing director's office. As well as a cover letter, the necessary explanation was conveyed via a phone call or personal visit; this was to create a snowballing effect in order to capture targeted respondents. The follow-up was conducted through phone calls. Eventually, a total of 511 middle managers and 194 top managers from 111 companies responded to the questionnaire. Putting aside the incomplete questionnaires, 476 completed sets from middle managers and 183 completed sets from top managers were finally available for data analysis.

3.10 Rationale for Structural Equation Modeling Approach

SEM is a multivariate technique that combines aspects of multiple regressions, and can estimate a series of inter-related dependence relationships simultaneously (Hair et al., 2009; Byrne, 2009). This technique can incorporate both unobserved variables (latent) and observed variables (manifest) in both a measurement model and a structural model. In a structural model, SEM provides the ability to measure the structural relationships between the set of unobserved variables while explaining the amount of unexpected variance (Byrne, 2009). As SEM depicts the structural relationships between variables, it is a model of relationships among constructs that takes a confirmatory approach to the analysis of structural theory relating to some phenomena. In SEM, the causal process is presented by a series of structural equations and, to enable a clearer conceptualization of the theory, the structural relations are modelled pictorially (Byrne, 2009).

SEM takes a confirmatory approach rather than an exploratory approach to data analysis, and can provide explicit estimates of error variance parameters. According to Hair et al. (2009) , SEM is the best multivariate procedure for testing both the construct validity and the theoretical relationships between a set of concepts represented by multiple measured variables. In addition, SEM is a powerful technique that combines measurement model and structural model into a simultaneous test (Hair et al., 2009; Aaker and Bagozzi, 1979). However, while a covariance-based SEM (CB-SEM) using analysis software such as AMOS, has been more popular in business research, a more recently dominant approach of SEM is the partial least square SEM (PLS-SEM) approach which, according to the latest work of Hair and his colleagues (2011), is more useful than CB-SEM. In this study, they make a comparison and rule of thumb for selecting CB-SEM or PLS-SEM.

Table 3.4: Rule of Thumb for CB-SEM or PLS-SEM Selection (Hair et al., 2011)

Research Goals

- If the goal is predicting key target constructs or identifying key "driver" constructs, select PLS-SEM.
- If the goal is theory testing, theory confirmation, or comparison of alternative theories, select CB-SEM.
- If the research is exploratory or an extension of an existing structural theory, select PLS-SEM.

Measurement Model Specification

- If formative constructs are part of the structural model, select PLS-SEM.
- Note that formative measures can also be used with CB-SEM but to do so it requires accounting for relatively complex and limiting specification rules.
- If error terms require additional specification, such as covariation, select CB-SEM.

Structural Model

- If the structural model is complex (many constructs and many indicators), select PLS-SEM.

- If the model is non-recursive, select CB-SEM.

Data Characteristics and Algorithm

- If your data meet the CB-SEM assumptions exactly, for example, with respect to the minimum sample size and the distributional assumptions, select CB-SEM. Otherwise, PLS-SEM is a good approximation of CB-SEM results.

- Sample size considerations:
    - If the sample size is relatively low, select PLS-SEM. With large data sets, CB-SEM and PLS-SEM results are similar, provided that a large number of indicator variables are used to measure the latent constructs (consistency at large).
    - PLS-SEM minimum sample size should be equal to the larger of the following: (1) ten times the largest number of formative indicators used to measure one construct or (2) ten times the largest number of structural paths directed at a particular latent construct in the structural model.

- If the data are to some extent non-normal, use PLS-SEM; otherwise, under normal data conditions, CB-SEM and PLS-SEM results are highly similar, with CB-SEM providing slightly more precise model estimates.

- If CB-SEM requirements cannot be met (e.g., model specification, identification, nonconvergence, data distributional assumptions), use PLS-SEM as a good approximation of CB-SEM results.

- CB-SEM and PLS-SEM results should be similar. If not, check the model specification to ensure that CB-SEM is appropriately applied. If not, PLS-SEM results are a good approximation of CB-SEM results.

Model Evaluation

- If you need to use latent variable scores in subsequent analyses, PLS-SEM is the best approach.

- If your research requires a global goodness-of-fit criterion, then CB-SEM is the preferred approach.

- If you need to test for measurement model invariance, use CB-SEM.

Following Hair et al.'s (2011) rule of thumb, a PLS-SEM approach is the most appropriate and effective method for the current research model based on the research objectives, complexity of model and sample size.

3.11 Chapter Summary

In summary, chapter three reviews the research design and research methodology adopted for this study. This is followed by a discussion about the definition of variables and the process of survey development. The pretesting of measures and a pilot test were explained, with a focus on reliability and validity test results. The unit of analysis, population and sample size, and data collection techniques were then specified. The chapter concluded with an explanation of data analysis strategies using PLS software.

CHAPTER FOUR – PRELIMINARY ANALYSIS AND SEM PROCEDURES

4.1 Introduction

This chapter describes the data preparation, reliability and validity assessment of measurements, and the techniques employed in this study to validate the integrative research model and test the hypotheses. First, the chapter describes the checking of the data, outliers and multivariate assumptions prior to commencing the statistical analysis. Second, it presents the assessment of reliability and validity through SPSS. Third, it describes the preliminary analysis of the Pearson correlations. Fourth, the issue of common-method variance in the present research is addressed, and finally, the rationale for data analysis approach selection is presented.

4.2 Exploratory Data Analysis and Descriptive Statistics

4.2.1 Data Coding

Before conducting the main analysis, the data needed to be coded and edited. The collected data was entered into Microsoft Excel in the initial stages. The items for each construct were coded accordingly. Table 4.1 indicates the coding of the current data.

4.2.2 Data Aggregation

As mentioned in the previous chapter, the data was collected from two organizational levels (top manager and middle manager), and each level data had to be aggregated separately to balance the data and unit of analysis's level.

Table 4.1: Data coding

Construct	Number of Items	Coding
Information technology	4 items	**IT1-IT4**
Innovation intention	10 items	**InnInt1-InnInt10**
Innovation infrastructure	8 items	**innInf1-InnInf8**
Organizational structure	4 items	**OrgStc1-OrgStc4**
Reward system	5 items	**Rew1-Rew5**
Management support	4 items	**MgSp1-MgSp4**
Knowledge sharing	7 items	**KWS1-KWS7**
Structural social capital	6 items	**SSC1-SSC6**
Relational social capital	13 items	**RSC1-RSC13**
Shared language	4 items	**Lang1-Lang4**
Story and narrative use	4 items	**Story1-Story4**
Exploratory innovation	5 items	**Explrty1- Explrty5**
Exploitative innovation	5 items	**Expltv1-Expltv-5**

As explained in the data collection section, in each firm, five middle managers were targeted as respondents for the questions for predictors' variables, and the two top managers for criterion variable. Due to the organizational unit level of analysis, the author converted the individual level's response to organizational level by aggregation of individual data in each organization. Top managers' data was also aggregated, and their average score used. However, this specific aggregation was not intended for level transformation. Before aggregation, an agreement test was required to be conducted to make sure the possibility of aggregation (James et al., 1983). Using the rater agreement method $r_{WG(J)}$, the agreement within individuals in each firm has been examined. The

initial results indicated critical non-agreement in 33 organizations. However, further analysis showed that the non-agreement was due to only one inconsistent response in the data sets for 31 firms. The author decided to remove the inconsistent answer from these firms. Dropping off the inconsistent respondent's data and recalculating the $r_{WG(J)}$ for the remaining sets for each variable resulted in acceptable levels of $r_{WG(J)}$. However, in 18 firms the agreement issues still existed but just for the data for one variable. In this case, the author decided to not consider that data for analysis and eliminated them from the data. Finally, only two firms' whole data – organization number 39 and 62 – were excluded from the subsequent analysis due to the low agreement issue.

In addition, the top managers' responses agreement test revealed a sufficient agreement level between two managers in every firm except for two. One of the firms was organization 39 which had the same issues for the middle manager's response which had already been removed from the data. The other firm – organization 77 – also needed to be removed from the data set, as there was no way to aggregate their responses. Thus, in total, three organizations were dropped from the data set, and the sample size reduced to 108 organizations. The $r_{WG(J)}$ values are presented in Appendix B. In the end the researcher had 108 responses at the organization level from 463 individual middle managers. Once the agreement test and aggregation were completed, the data was transferred to SPSS for analysis.

Values and measures were then defined based on the questionnaire scale. For demographic items, there are categorical values while the Likert scale was used for other items. (Its range is from 1=strongly disagree to 5=strongly agree.) Once data coding and cleaning was completed, assumptions were tested and the reliability of the

measures conducted. The results of these analyses are discussed in the following sections.

4.3 Demographic Analysis of Respondents

Table 4.2 shows the details of the companies which participated in this study. Only 25.5 percent of participating companies were from the pharmaceutical sector; the remaining participating companies were from the finance sector.

Table 4.2: Industry and Ownership

Banking	31	% 28.70
Pharmaceutical	27	% 25.00
Insurance	20	% 18.50
Invest & leasing	30	% 27.80
Total	**108**	**% 100**
Governmental	9	% 8.30
Non-Governmental	99	% 91.70
Total	**108**	**% 100**

Table 4.3 provides the demographic details for respondents based on their work experience, age, education and gender. As indicated in the table, most of the managers have been working for two years or more, and the majority of respondents (78.6%) have more than five years' work experience. This indicates that respondents come from an appropriate population with enough work experience. This is also evidence that they have had sufficient time and opportunity to build their connection within relevant communities of practice.

Table 4.3: Profile of Respondents

Variable	Frequency	Percent	Valid Percent
Work experience			
Less than 2 years	13	2.80	2.90
2 – 5 years	79	17.10	17.70
6 – 10 years	137	29.60	30.70
11- 20 years	109	23.50	24.40
More than 20 years	108	23.30	24.20
Total	446	96.30	100.00
Missing	17	3.70	
Total:	463	100.00	
Age			
Below 25	4	0.90	0.90
26-35	214	46.20	48.00
36-45	116	25.10	26.00
46-50	51	11.00	11.40
Above 50	61	13.20	13.70
Total	446	96.30	100.00
Missing	17	3.70	
Total	463	100.00	
Education			
PhD or equivalent	63	13.60	14.20
Master	203	43.80	45.60
Bachelor	168	36.30	37.80
Diploma	11	2.40	2.50
Total	445	96.10	100.0
Missing	18	3.90	
Total	463	100.00	
Gender			
Female	117	25.30	26.20
Male	329	71.10	73.80
Total	446	96.30	100.00
Missing	19	3.70	
Total	463	100.00	

About of half the respondents (48%) are between 26 and 35 years old. Nearly 38 percent (37.5 %) are between 36 and 50 years. Respondents aged 51 years and above

total 13.7 percent, and the youngest category – those below 25 years – are less than one percent.

A significant percentage of the population (97.5%) holds bachelor and higher credentials. Master degrees are the majority with 45.6 percent. Based on gender, there are three males to every female (3:1). In another demographic section, respondents were asked two questions about their communities of practice: first, was the community limited to colleagues within the organization or did it extend beyond the organization's boundaries? The second question was; in the case of internal communities, was it limited to their current department or to the whole organization? These questions were designed to find out the knowledge-sharing process boundaries and limits. As shown in Table 4.4, 85.5 percent of middle managers asserted their community of practice was an internal community and 71 percent said it was limited to their work department.

Table 4.4: Features of Community of Practice

Is your community of practice an internal or external community?	Frequency	Percent	Valid Percent	Cumulative Percent
Internal	360	77.8	85.5	85.5
External	61	13.2	14.5	100
Total	421	90.9	100	
Missing	42	9.1		
Total	463	100		
Is your community of practice the same as your department?				
Yes	299	64.6	71.0	71.0
No	122	26.3	29.0	100.0
Total	421	90.9	100.0	
Missing	42	9.1		
Total	463	100.0		

4.4 Examination of Outlier

An outlier is defined as "an observation (such as extreme value) that is substantially different from the other observations on one or more variables" (Hair et al., 2009). In this study, the presence of outliers was examined by comparing the original mean of all constructs against the five percent trimmed mean. As shown in Table 4.5, the results indicate that the five percent trimmed mean for all constructs does not depart much further from their original mean, indicating if there are cases different from other observations; the outlying cases do not have a lot of influence on the mean (Pallant, 2005).

Table 4.5: Mean, and Five Percent Trimmed Mean-Outliers

Constructs	Mean	5% Trimmed Mean	Std. Error
Information technology	13.83	13.84	0.20
Innovation intention	33.15	33.23	0.55
Innovation infrastructure	28.32	28.42	0.32
Organizational structure	12.26	12.36	0.21
Reward system	17.80	17.90	0.22
Management support	13.66	13.75	0.27
Knowledge sharing	23.47	23.34	0.27
Structural social capital	19.01	18.98	0.25
Relation social capital	47.74	47.83	0.59
Shared language	13.41	13.41	0.16
Story usage	11.53	11.58	0.26
Exploratory innovation	16.73	16.78	0.40
Exploitative innovation	18.60	18.62	0.31

Furthermore, when exploring outliers in SPSS using box plot and specifying the dependent and factor variables, there was only one case in a critical situation for outliers, and it has been resolved (see Appendix C).

4.5 Assessment of Multivariate Assumptions

4.5.1   Testing for Normality

Normality is the fundamental assumption in data analysis that refers to the shape of the data distribution for an individual metric variable and its correspondence to the normal distribution (Hair et al., 2009). The distribution of data was examined using skewness and kurtosis values. According to Hair and his colleagues (2009), skewness looks at distribution balance, whether it is centred (symmetric) or shifts to the left or right. It is a measure of symmetry of a distribution; skewness values falling outside the range of -1 to +1 indicate a substantially skewed distribution. If the calculated z value for skewness exceeds the critical value of ± 2.58, at the significance level of $p < 0.01$; or ± 1.96, at the significant level of $p < 0.05$, the distribution of the data is considered non-normal. Kurtosis is the measure of the peaked nature or the flatness of a distribution when compared to a normal distribution. A positive value indicates a relatively peaked distribution, and a negative value indicates a relatively flat distribution (Hair et al., 2009). Any kurtosis value less than 1 is negligible, and any value from 1 to 10 indicates moderate non-normality. For perfectly normal distribution, the kurtosis and skewness should be equal to zero (Pallant, 2010).

As demonstrated in Table 4.6, the results indicate that all the skewness values are in the range, and most of the kurtosis values of variables are less than one and negative,

except for innovation infrastructure, organizational structure, knowledge sharing and relational social capital. These values violate the normality assumption only slightly as they had not departed much from the value of one. The most departed value was for knowledge sharing with a kurtosis value of 2.156. However, as mentioned in the previous chapter, there is no normality assumption and requirement using PLS-SEM for analysing the data (Hair et al., 2011).

Table 4.6: Normality, Skewness and Kurtosis

Constructs	Mean	Skewness	Kurtosis
Information technology	13.83	-0.016	-0.152
Innovation intention	33.15	-0.125	-0.592
Innovation infrastructure	28.32	-0.585	**1.381**
Organizational structure	12.25	-0.717	**1.058**
Reward system	17.80	-0.560	0.340
Management support	13.66	-0.362	0.423
Knowledge sharing	23.46	0.986	**2.156**
Structural social capital	19.01	0.222	0.315
Relation social capital	47.74	-0.455	**1.884**
Shared language	13.41	-0.136	-0.172
Story usage	11.53	-0.315	-0.180
Exploratory innovation	16.73	-0.079	-0.620
Exploitative innovation	18.60	-0.038	-0.470

4.5.2 Testing for Homoscedasticity

Homoscedasticity refers to the assumption that dependent variables exhibit equal levels of variance across the range of independent variables (Hair et al., 2009). Homoscedasticity and normality assumptions are related, and it has been acknowledged that all constructs are within the range of normal distribution. Thus, the visual inspection of the scatter plot did not show any pattern of increasing or decreasing residuals (refer to Appendix D). Therefore, the multivariate assumption of homoscedasticity is not violated in this study.

4.5.3 Testing for Linearity

Linearity in this study is assessed by running a series of simple linear regression analyses. It is expected that the points would be almost a straight line around the diagonal axis so as not to violate the assumptions on the randomness of the residuals. Results of the current study show that the score clustered uniformly around the regression line (refer to Appendix D). Therefore, the results confirm the expectations, and thus there is no violation of the multivariate assumption of linearity.

4.5.4 Testing for Multicollinearity

Multicollinearity refers to the relationship between independent variables while the correlation value of 0.90 among independent variables indicates multicollinearity (Pallant, 2010). This study compares the tolerance index (TI) and the variance of inflation factor (VIF) (Hair et al., 2009). If the tolerance index is less than 0.1, a problem with multicollinearity is present. In addition, the bigger the value for VIF, the

higher the multicollinearity, and a VIF value higher than 10 suggests the existence of a multicollinearity problem.

As shown in Table 4.7, tests for multicollinearity indicate that the tolerance index values for all constructs are greater than 0.10, while the VIF values are less than 10. Therefore, the data set of this study has not violated the multicollinearity assumption of multicollinearity.

Table 4.7: Multicollinearity and singularity

Model	(Constant)	Correlations			Collinearity Statistic	
		Zero-order	Partial	Part	Tolerance	VIF
Dependent variable: **Knowledge sharing**	Information technology	0.477	0.181	0.135	0.677	1.476
	Innovation intention	0.509	-0.048	-0.036	0.222	4.507
	Innovation infrastructure	0.553	0.068	0.050	0.245	4.079
	Organizational structure	0.638	0.227	0.212	0.253	3.952
	Reward system	0.375	0.117	0.087	0.676	1.479
	Management support	0.554	0.072	0.053	0.323	3.096

4.6 Goodness of Measure

According to Hair et al. (2009), two major criteria for evaluating measurements are reliability and validity. This study assessed the reliability and validity of measurements. According to Malhotra (2008), a perfect validity requires a perfect reliability, and a reliability test is to be conducted prior to a validity test (Malhotra, 2008). Indeed, the "garbage items" need to be purified from the construct to prevent additional dimensions in factor analysis (Churchill Jr, 1979).

4.6.1   Construct Validity Assessment

The validity of a scale is the degree to which the scale measures what it is intended to measure, and the main types are content validity, criterion and construct validity. At this step, only construct validity, which includes convergent validity and discriminant validity, was required to be tested. Factor analysis is one of the techniques that can be used to measure the construct's validity (Hair et al., 2009). Factor analysis is used to gather information about inter-relationships among a set of variables (Pallant, 2010). There are two types of factor analysis for verifying construct validity: (1) exploratory factor analysis (EFA), and (2) confirmatory factor analysis (CFA).

According to Zikmund and his colleagues (2009), an EFA is conducted when a researcher doubts how many factors exist between a set of variables. Moreover, Bagozi and Philips (1991) assert that CFA is a powerful method in addressing construct validity. In the current study, all the factors and constructs were adapted from previous studies where the constructs had been developed and validated. Based on these assumptions, the author decided to conduct the CFA method only to assess the validation of the measures. The results of this CFA are discussed in chapter five.

4.6.2   Preliminary Reliability of Measures

A construct can be purified using its corrected inter-item correlation. The correlation value of an item with other items must reach a sufficient level of 0.3. Otherwise, the item must be removed from the construct. Generally, doing this will improve the reliability of the construct. This test can be conducted in SPSS in the following path; analysis> scale > reliability analysis. Two tests must be checked; first,

the scales, if the item is deleted and second, examine the correlation. Cronbach's alpha indicates that the total reliability and value above 0.70 of items shows a sufficient level of reliability (Hair et al., 2009). Inter-item correlation matrix, as its name describes, indicates the correlation level between a construct's items.

Table 4.8: Constructs' Reliability

Measurement	Original items	Cronbach's Alpha		Deleted items
		Before	After	
Information technology	4	0.847	0.847	-
Organizational constituency	5	0.908	0.908	-
Innovation propensity	5	0.924	0.924	-
Organizational learning	5	0.880	0.880	-
Employee creativity and empowerment	3	0.726	0.726	-
Organizational structure	4	0.807	0.807	-
Reward system	5	0.733	0.892	1
Management support	4	0.939	0.939	-
Knowledge sharing	7	0.818	0.868	2
Structural social capital	4	0.817	0.835	1
Shared norms	4	0.890	0.890	-
Trust	4	0.924	0.924	-
Identification & Obligation	5	0.908	0.908	-
Shared language	4	0.711	0.711	-
Story and narrative use	4	0.958	0.958	-
Exploratory innovation	5	0.851	0.851	-
Exploitative innovation	5	0.793	0.798	1

A reliable construct requires a correlation level of 0.3 and above. Any item with a correlation below 0.3 must be taken away from the construct (Field, 2009). Lastly, in the item-total statistics table, there are two columns of data which need to be considered; the correlated inter-item correlation and Cronbach's Alpha if the item is deleted. An item can be flagged to be removed from the construct if its inter-item correlation is less than 0.5, and by its elimination the total Cronbach's Alpha improves significantly.

Thus, following this rule of thumb, useless items are to be removed, and constructs purified. As a result, as shown in Table 4.8, five items must be from four constructs. The last column of the table indicates which constructs need to be purified. Therefore, after purification, the results indicated that all constructs provided adequate coverage of the concepts, all items were understandable and clear, and that the questionnaire was a reliable measurement tool, suggesting adequate reliability of the scale measurement. As indicated in Table 4.8, results of internal consistency and reliability of measures revealed Cronbach alpha values for all constructs to be between 0.711 and 0.958.

4.6.3 Pearson Correlation

Pearson correlation is employed to measure the relation among a group of constructs. The correlation value (r) of greater than 0.70 indicates very strong relationships among the constructs, while correlation value (r) of 0.50 to 0.70 indicates strong relationships between constructs, correlation value (r) of 0.30 to 0.50 indicates moderate relationships between constructs, and correlation value (r) of 0.10 to 0.30 indicates relatively weak relationships between constructs (Pallant, 2010). Based on the suggestion by Pallant (2010), any correlation value (r) of more than 0.80 would perhaps

be a reason for concern, as this would indicate the existence of multicollinearity. The results of the Pearson correlation test are presented in the following table.

Table 4.9: Pearson Correlations

	IT	InnInt	InnInf	OrgSt	Rew	MgSp	KS	STC	RLC	Lang	Story	Explrty
InnInt	.472**											
innInf	.444**	.700**										
OrgSt	.504**	.817**	.660**									
Rew	.207*	**.018**	.245**	**.067**								
MgSp	.469**	.768**	.648**	.797**	.212*							
KS	.468**	.545**	.537**	.603**	.258*	.577**						
STC	.336**	.382**	.403**	.548**	.342**	.428**	.472**					
RLC	.430**	.664**	.615**	.650**	.221*	.639**	.702**	.586**				
Lang	.392**	.489**	.496**	.503**	.377**	.510**	.562**	.604**	.585**			
Story	**.160**	.438**	.393**	.492**	**.101**	.284*	.474**	.461**	.484**	.541**		
Explrty	.327**	.522**	.388**	.532**	.044	.463**	.343**	.314**	.355**	.391**	.433**	
Expltv	.360**	.363**	.335**	.415**	.213*	.307**	.397**	.350**	.320**	.302**	.298*	.672**

**. Correlation is significant at the 0.01 level
*. Correlation is significant at the 0.05 level

As shown in Table 4.9, the results of Pearson correlations between constructs show that all constructs were significantly correlated ($p < 0.01$), except for the reward correlation with the innovation intention and organizational structure, and the story dimension of cognitive social capital and innovation exploratory. There was another insignificant correlation between the story dimension of cognitive social capital and information technology too. All the correlation values were positive, indicating positive relationships among all constructs. The highest correlation value (r) was 0.797, which was the correlation between organizational structure and management support, and the lowest correlation value (r) was 0.018, which was the correlation between reward

system and innovation intention. Thus, the Pearson correlation results revealed no multicollinearity issue of concern among constructs.

4.7 Assessment of Common Method Variance

Among the problems researchers can encounter when conducting survey research, the common method variance may be the most troublesome. Common method variance (CMV), also known as methodological artefact, occurs when the research approach employed affects the accuracy of measurements, leading to incorrect relationships between constructs. Prior research indicated that CMV can inflate or deflate observed relationships between constructs, and lead to Type I or Type II error (Podsakoff et al., 2003) and wrong conclusions. Thus, this study took steps to ensure the issue of CMV was addressed.

First, when designing the questionnaire survey, the author made the decision not to reveal the relationships between independent variables, moderating variables and dependent variables that would allow respondents to make assumptions about the relationships that might exist between variables. Second, as it was also recommended to deal with the common method bias (Wieseke et al., 2008; Collins and Smith, 2006; Jansen et al., 2006c) , this study separated and collected data for independent and dependent measures from different sources and levels.

4.8 Chapter Summary

This chapter provided a descriptive analysis of the data, including data preparation, reliability and the validity assessment of measurements, and the techniques

employed in the study to validate the integrative research model and test the hypotheses. It also addressed the multivariate assumptions before commencing the statistical analysis. Finally, the author discussed and addressed the common method variance and explained the rationale for the selection of data analysis approach.

CHAPTER FIVE – DATA ANALYSIS AND RESEARCH FINDINGS

5.1 Introduction

This chapter presents the results of the multivariate analysis using PLS-SEM. This chapter is divided into four sections. Section one assesses the quality of the measurement model for the research model. Section two presents the structural model based on results from the measurement model. The structural model was developed from the integrative research model discussed in chapter two and the hypotheses postulated in chapter three. The third section discusses the results of the structural model and evaluates the effects and concludes with a chapter summary.

5.2 Assessment of Measurement Model

This study used SmartPLS V2.0 M3 software to conduct the analysis. According to the literature, several criteria need to be considered when evaluating a reflective measurement model. Churchill (1979) and Peter (1981) cited by Götz, Liehr-Gobblers et al. (2010) suggest that the basic assessment of a reflective measurement model using the PLS approach must include indicator reliability, reliability of construct, convergent validity and discriminant validity analysis. Thus, the outer loading is used for indicator reliability evaluation, whereas composite reliability (CRs) and Cronbach's alphas are used to evaluate construct reliability. Average variance extracted (AVE) measures were used to assess convergent and discriminant validity. Cutoff values for the outer loading was 0.50, the composite reliability was 0.60; Cronbach's alpha was 0.70, and the AVE was 0.5 (Götz et al., 2010; Nunnally and Bernstein, 1994).

Table 5.1: Outer Loading

Items	IT	Innovation intention	Innovation infrastructure	Organizational structure	Reward system	Management support
Our company provides IT support for collaborative works	.956					
Our company provides IT support for communication among organization members	.969					
Our company provides IT support for searching for and accessing necessary information	.974					
The technological tools available at the organization for sharing knowledge are effective	.906					
As an employee, I feel enabled to generate ideas		.826				
I feel that I am trusted to act in the organization's best interests with minimal supervision		.865				
I am encouraged to challenge decisions and actions in this organization if I think there is a better way		.867				
We have an effective environment for collaboration within and between departments		.852				
Communications are open and honest		.871				
Innovation is an underlying culture and not just a word			.948			
Innovation is a core value in this organization			.942			
We have an innovation vision that is aligned with projects, platforms, or initiatives			.952			
Our senior managers are able to effectively cascade the innovation message throughout the organization			.905			
There is a coherent set of innovation goals and objectives that have been articulated			.938			
The training I receive is directed at helping me deliver customer value				.787		
There is an expectation to develop new skills, capabilities and knowledge that is directed toward supporting innovation in this organization				.807		
Continued organizational learning is encouraged				.915		

There is mentorship and post-training support			.826			
This organization uses my creativity to its benefit, that is, it uses it in a good way			.768			
I am prepared to do things differently if given the chance to do so				.883		
Innovation in our organization is more likely to succeed if employees are allowed to be unique and express this uniqueness in their daily activities				.833		
I view uncertainty as opportunity, and not as a risk				.677		
Employees actively participate in the process of decision-making					.841	
Information flows easily throughout the organization regardless of employee roles or other boundaries					.867	
Certain tasks require the formation of teams with members from different departments in order to be accomplished					.638	
Employees are treated as equals amongst peers, and this is evident in their participation levels					.830	
We are rewarded for sharing our knowledge and experience with our colleagues						.817
We are rewarded for sharing our knowledge with colleagues with monetary reward like higher salary or bonus						.979
We are rewarded for sharing our knowledge with colleagues with non-monetary reward like job promotion or increased job security						.901
The level of reward I already received for knowledge sharing influences my intention to share knowledge afterward						.788
The management is aware of the importance of knowledge sharing						.929
Top managers think that encouraging knowledge sharing with colleagues is beneficial						.914
Top managers provide most of the necessary help and resources to enable employees to share knowledge						.928
Top managers always support and encourage employees to share their knowledge with colleagues						.910

Table 5.1: Outer Loading (continued)

Items	Know sharing	Exploratory innovation	Exploitative innovation	Structural social cap	Relational social cap			Shared language	Story usage
					norms	trust	Oblig		
When I have learned something new, I tell my colleagues about it	.784								
When they have learned something new, my colleagues tell me about it	.890								
Knowledge sharing among colleagues is considered normal in my company	.865								
Colleagues in my company share knowledge with me when I ask them to	.734								
Colleagues in my company share their skills with me when I ask them to	.761								
Our unit accepts demands that go beyond existing products and services		.746							
We invent new products and services		.920							
We experiment with new products and services in our local market		.752							
We commercialize products and services that are completely new to our unit		.819							
We frequently utilize new opportunities in new markets		.678							
We frequently refine the provision of existing products and services			.813						
We regularly implement small adaptations to existing products and services			.804						
We introduce improved but existing products and services for our local market			.818						
We improve our provision's efficiency of products and services			.734						
In my community….									
…members know each other closely				.880					
…members interacted frequently with other members				.955					
…members interact with many members				.900					
…members could directly access any other member				.931					
…most members knew each other before they joined this community				.779					
…members were expected to have a team spirit					.924				
…members were expected to be cooperative					.922				

…members were expected to have an open mind					.750				
…members were expected to share what they knew					.894				
… members trusted each other enough to share all relevant information						.866			
…members believed that all members were acting in good faith						.914			
…members were confident they could trust each other						.899			
…members relied on each other for the truthfulness of the information shared						.931			
…members had a strong sense of belonging to the community							.820		
…members identified with each other as one community							.892		
…members cared for other members' well being							.875		
…members expected others to help them when they helped							.831		
…members were expected to return favors							.858		
…members used a common language								.869	
…the terms used by members were known to most of us								.870	
…we had our own common words to communicate ideas and codes								.792	
…members used technical terms common among us								.820	
…members used stories to communicate subtle ideas									.925
…stories and narratives were used to communicate rich sets of ideas									.966
…stories and metaphors were used to create and preserve rich meaning									.970
…stories and narratives were used to share hard to communicate ideas									.957

In Table 5.1, the items with loadings higher than the cut-off value of 0.5 were retained, which were significant at 0.05 to fit the model at an optimum level.

Table 5.2: Measurement model results for AVE, CR, Cronbach's Alpha

	AVE	Composite Reliability	Cronbach's Alpha
IT	0.906	0.974	0.965
Organizational constituency	0.733	0.932	0.914
Innovation propensity	0.878	0.973	0.965
Organizational Learning	0.676	0.912	0.880
Employee creativity	0.645	0.843	0.727
Organizational structure	0.639	0.875	0.805
Reward system	0.766	0.928	0.978
Management support	0.848	0.957	0.940
Knowledge sharing	0.655	0.904	0.868
Structural social capital	0.794	0.950	0.934
Shared norms	0.767	0.929	0.897
Trust	0.815	0.946	0.924
Identification &obligation	0.732	0.931	0.908
Shared Language	0.703	0.904	0.859
Story usage	0.912	0.976	0.968
Exploratory innovation	0.620	0.890	0.849
Exploitative innovation	0.629	0.871	0.803

Table 5.2 presents the results of AVE, composite reliability and Cronbach's alpha for the constructs. The composite reliability and Cronbach's alpha for all constructs exceeded the recommended cutoff point of 0.60 and 0.70 respectively. The average variance extracted (AVE) for the constructs was higher than 0.5 – hence establishing convergent validity.

The researcher also reviewed the discriminant validity of the constructs. There are two criteria for examining discriminant validity. First, according to Fornell and Larcker (1981), the AVE of each latent construct must be greater than the latent construct's highest

squared correlation with any other latent construct. The second criterion of discriminant validity is that the indicator's loading with its associated latent construct should be higher than its loadings with all the remaining constructs (Hair et al., 2011).

Table 5.3 compares the results of the inter-construct correlation with the square root of AVE to estimate discriminant validity. The results show that the square root AVE's value of each construct are higher than its correlation estimate with other constructs, which demonstrates that all constructs in the measurement model are distinguishable. The other assessment results – cross loading – also support the adequacy of the discriminant validity of the measurement model. As reported in Appendix E, all the indicators loaded much higher on their hypothesized factor than on other factors (own loadings are higher than cross loadings (Chin, 2010)). Thus, the measurement model quality was considered evidence of adequate reliability, convergent validity and discriminant validity.

Table 5.3: Evaluation of Discriminant Validity

	Creativity	Exploratory	Exploitative	IT	Identification & obligation	innovation propensity	knowledge sharing	shared language	management support	organizational constituency	organizational learning	organizational structure	Reward System	structural social capital	shared norms	story usage	Trust
creativity	**0.803**																
exploratory	0.027	**0.788**															
exploitative	0.037	0.578	**0.793**														
IT	0.193	0.242	0.140	**0.952**													
Identi-obligation	0.183	0.389	0.368	0.301	**0.856**												
inn propensity	0.094	0.337	0.144	0.405	0.497	**0.937**											
knowledge share	0.253	0.331	0.365	0.270	0.621	0.489	**0.810**										
shared language	0.182	0.328	0.181	0.261	0.435	0.325	0.399	**0.839**									
mgt support	0.101	0.493	0.270	0.305	0.607	0.575	0.533	0.367	**0.921**								
org constituency	0.192	0.444	0.325	0.244	0.518	0.566	0.520	0.364	0.635	**0.857**							
org learning	0.219	0.513	0.389	0.422	0.620	0.559	0.545	0.391	0.773	0.776	**0.823**						
org structure	0.258	0.469	0.356	0.413	0.640	0.675	0.659	0.322	0.790	0.676	0.774	**0.800**					
reward system	0.296	0.047	0.212	0.181	0.177	0.010	0.120	0.277	0.118	0.041	0.192	0.211	**0.875**				
structural SC	0.178	0.309	0.199	0.446	0.303	0.206	0.315	0.187	0.248	0.143	0.212	0.325	0.052	**0.891**			
shared norms	0.330	0.288	0.228	0.352	0.688	0.395	0.540	0.373	0.510	0.439	0.543	0.541	0.115	0.277	**0.876**		
story use	0.226	0.416	0.229	0.250	0.388	0.447	0.449	0.669	0.225	0.339	0.304	0.358	0.125	0.295	0.314	**0.955**	
trust	0.355	0.374	0.280	0.223	0.807	0.509	0.712	0.449	0.621	0.587	0.573	0.700	0.052	0.321	0.677	0.469	**0.903**

5.3 Structural Model Evaluation

Once all constructs in the measurement model are validated, and a satisfactory fit achieved, the structural model can be tested via assessing path analysis and specifying the regression models for all factors derived in the measurement model (Hair et al., 2009; Götz et al., 2010).
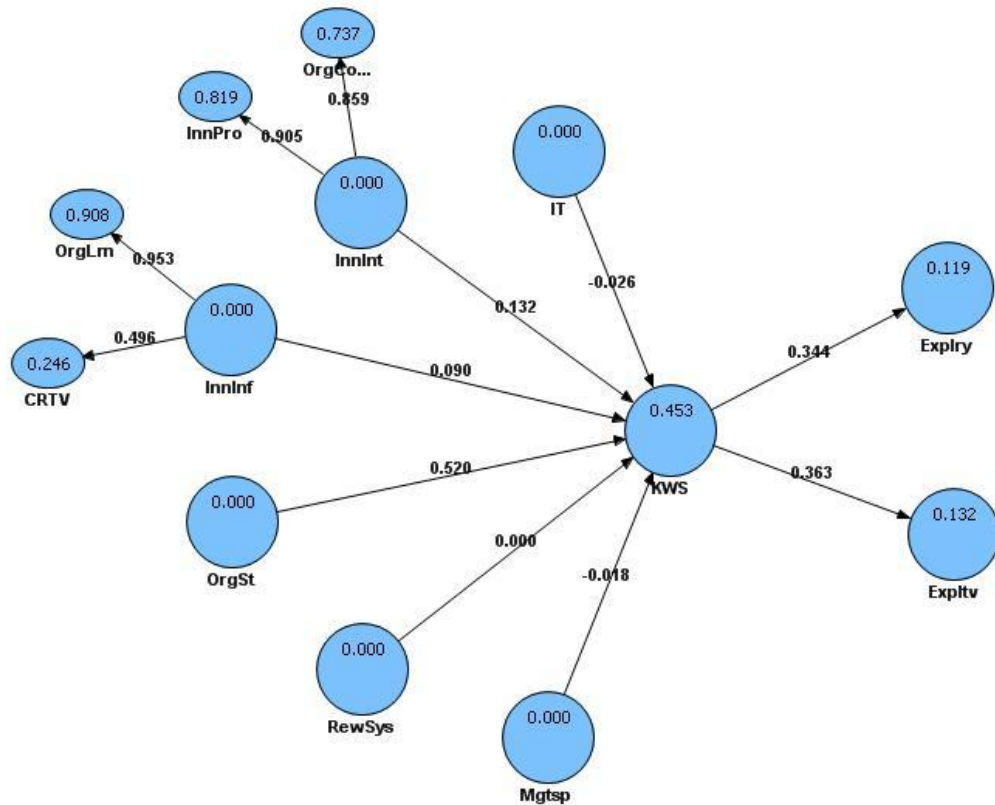

Figure 5.1. PLS path modeling analytical results of main effects

The structural model presents the relationships between exogenous constructs and endogenous constructs. A structural model is used to capture the linear regression effects of the exogenous constructs on the endogenous constructs, and the regression effects of the endogenous constructs on one another (Hair et al., 2009). The structural model specifies the pattern of the relationships among the latent constructs. The structural model is of great interest to researchers because it offers a direct test of the theory of interest (Cheng, 2001). Estimations of the path coefficient are interpreted as standardized beta weights in a regression model and represent the direct effects of exogenous constructs on the endogenous constructs.

In this study, two types of relationships were examined – direct effects and interaction effects. First, we tested the main model (the direct relationship between independent and dependent variables) – the relationships between organizational knowledge-sharing enablers, information technology, innovation culture (innovation intention and innovation infrastructure), organizational structure, reward system and management support and knowledge sharing.

In the second part, the relationships between knowledge sharing and exploratory and exploitative innovation were examined. In the next model, which is an integrative model, the author tested the whole model with the interaction effects of social capital. Figure 5.1 exhibits the structural model and the analytical results for the main effects. To test the hypotheses, the PLS bootstrapping method was used with 200 re-samples to generate T values for the paths in the model. Chin noted that 200 re-samples are reasonable to minimize and stabilize standard error (Chin, 2010) .

5.3.1   Hypothesis Testing: Direct Relationships

The overall effect of the model was determined by $R^{2.}$ According to Hock and Ringle (2010), substantial, moderate and weak cutoff values for R^2 are 0.67, 0.33 and 0.19 respectively. Overall, the model showed a moderate prediction for the knowledge-sharing variable with an R^2 of 0.453. R^2 for exploratory innovation and exploitative innovation are 0.119 and 0.132 respectively, which is at a weak level. Path coefficients and T values for the main effects after bootstrapping are shown in Table 5.4.

Table 5.4: Main Effect Results

Direct relationships	Path coefficients	T Statistics	Supported
H1a: IT -> KW Sharing	-0.026	0.356	No
H2a: Inn Intention -> KW Sharing	0.132	0.986	No
H3a: Inn Infrastructure -> KW Sharing	0.090	0.533	No
H4a: Org structure -> KW Sharing	**0.520**	**3.700**	***Yes
H5a : Reward -> KW Sharing	0.000	0.001	No
H6a : Mgt support -> KW Sharing	-0.018	0.125	No
H7a: KW Sharing -> Exploratory	**0.344**	**5.780**	***Yes
H7b: KW Sharing -> Exploitative	**0.363**	**5.468**	***Yes

Note: ***t-value > 2.58, p<0.01
        ** t-value > 1.96, p<0.05

5.3.2   Hypotheses Testing: Moderating Effect of Social Capital of Communities of Practice

At the second phase, the integrative model with interaction effects (Figure 5.2) was tested. R^2 as the overall effect for knowledge sharing was improved to 0.617, which is still moderate although close to substantial level.
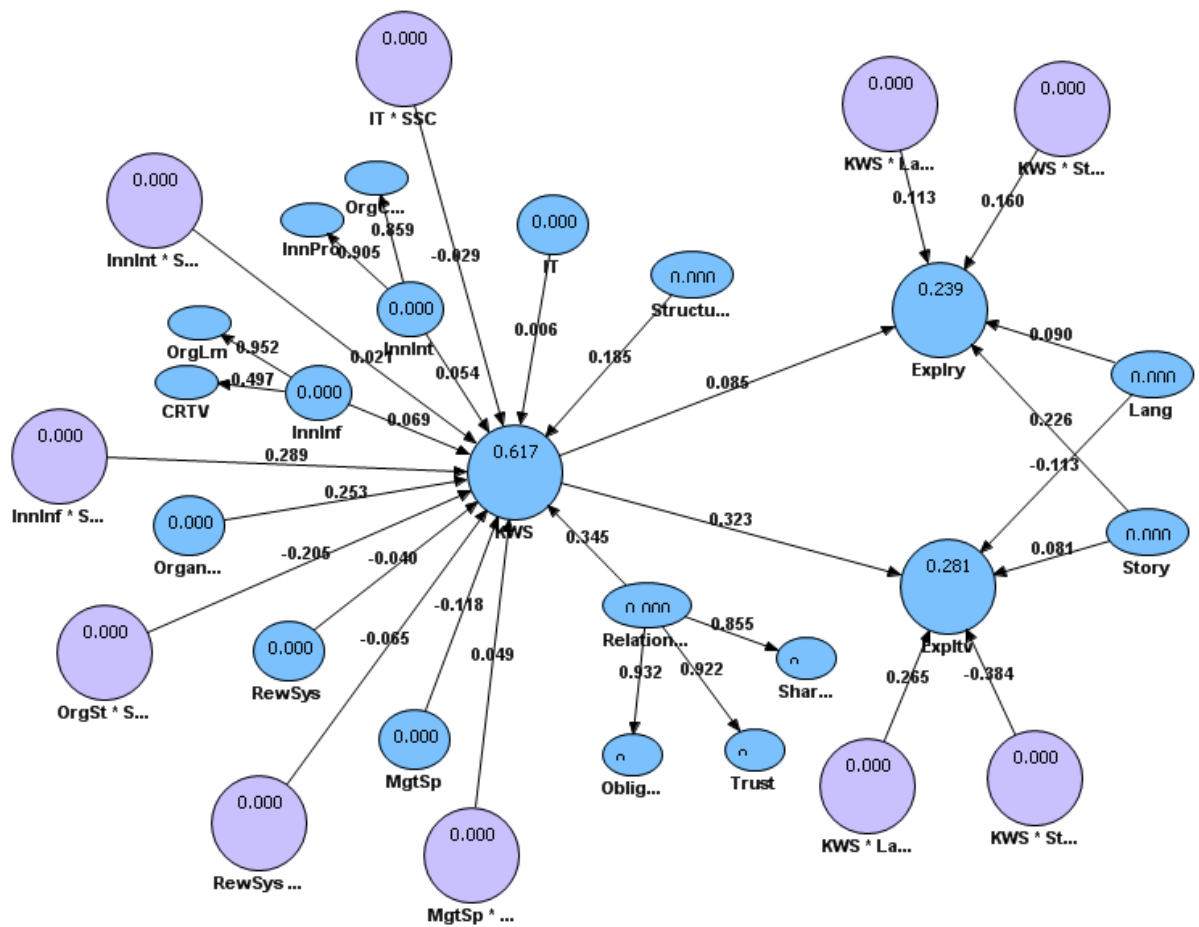

Figure 5.2. PLS path modeling analytical results of interaction effects

R^2 for exploratory innovation was enhanced from 0.119 to 0.239, and for exploitative innovation changed from 0.132 to 0.281. R^2 for all three constructs of knowledge sharing, exploratory and exploitative experienced such improvement. The path coefficients and T value for interaction effects after bootstrapping are shown in Table 5.5.

Table 5.5: Interaction Effect Results

Path	Path coefficients	T - value	Supported
H1b: IT * Structural SC -> KW Sharing	-0.029	0.131	No
H2b: Inn Intention * Structural SC -> KW Sharing	0.021	0.098	No
H3b: Inn Infrastructure * Structural SC -> KW Sharing	0.289	0.858	No
H4a: Org Structure * Structural SC -> KW Sharing	-0.206	0.813	No
H5a: Reward System* Relational SC-> KW Sharing	-0.065	0.375	No
H6b: Management Support * Structural SC-> KW Sharing	0.049	0.204	No
H8a: KW Sharing * Language -> Exploratory Innovation	0.113	0.540	No
H8b: KW Sharing * Language -> Exploitive Innovation	**0.265**	**2.012**	**** Yes**
H8c: KW Sharing * Story -> Exploratory Innovation	0.160	1.103	No
H8d: KW Sharing * Story -> Exploitive Innovation	-0.384	1.360	No

Note: ***t-value > 2.58, p<0.01
** t-value > 1.96, p<0.05

From Table 5.5, unlike the study's expectations, the effects of interaction between structural and relational with organizational enablers on knowledge sharing were found to be not significant. Similarly, the proposition of moderation effects of cognitive social capital between knowledge sharing and exploratory and exploitative innovation were also not supported, except for the interaction effect of shared language and knowledge sharing on exploitative innovation. This interaction was significant at p<0.05. Therefore, only hypothesis H8b is supported.

5.4 Chapter Summary

This chapter presented the results of multivariate analysis using PLS-SEM and starting with assessment of the quality of the measurement model of the research framework. Presentation of the structural model based on the measurement analysis results followed. The chapter continued with evaluation of the findings of the main and interaction effects. Of the main effects of organizational enablers of knowledge sharing, only organizational structure showed a significant effect and predicting role on knowledge sharing. Knowledge sharing also showed an effective influence on exploratory and exploitative innovation. Social capital did not indicate a moderating role in the relationships between organizational enablers and knowledge sharing and knowledge sharing and innovation capability. Only the shared language dimension of cognitive social capital showed an effect on the interaction between knowledge sharing and exploitative innovation. The findings of this study are discussed in the next chapter.

CHAPTER SIX – DISCUSSIONS AND CONCLUSION

6.1 Introduction

This chapter is divided into five main sections. Section one discusses the findings. Section two provides an overview of the study while the following section discusses the study's limitations, which provides the base for future research directions. Section four examines the theoretical contribution and managerial implications of the study, and the final section concludes the thesis.

6.2 Overview of the Study

The role of communities of practice and social capital in knowledge management and innovation drives the understanding of its impact on every business context. This study is motivated by the need to establish an integrative model to explain the influence of knowledge-sharing enablers on knowledge sharing and innovation in the context of communities of practice. Most importantly, this study attempts to examine the moderating role of the social capital of communities of practice on two primary relationships: (1) the relationship between knowledge-sharing enablers and knowledge sharing, and (2) the relationship between knowledge sharing and exploratory and exploitative innovation. The following section discusses the finding in detail.

6.3 Discussion

The study on hand intends to examine a moderating role of social capital on a general knowledge sharing framework. Based on the initial results from analysis of the whole respondents' sample, only one direct effect – organizational structure – found to be a predictor for knowledge sharing. The results confirm knowledge sharing impact on both exploratory and exploitative innovations. The hypothesized moderating relationships could not be supported by the data in the full population except for shared language dimension of cognitive social capital. This led the author to conduct further analysis and compare the result in different demographic and industry contexts.

Table 6.1: Direct relationships in various sub-group populations

Direct impact on KS / Context	IT	Innovation culture	Organizational structure	Management support	Reward system
Whole population	**---**	**---**	**Significant**	**---**	**---**
Bank, Insurance & Investment	---	Significant	Significant	---	---
Bank , Insurance & Pharmaceutical	---	---	Significant	---	---
Pharmaceutical, Insurance & Investment	---	---	Significant	---	Significant
Bank & Pharmaceutical	---	---	Significant	---	Significant
Under 36 years	Significant	Significant	Significant	---	---
36 and above	---	Significant	Significant	---	Significant

The following section will discuss the results in the whole and sub-group populations.

6.3.1   Effect of Organizational Factors on Knowledge Sharing

In the main effect model, proposed organizational factors are able to explain more than 45 percent (45.3 %) of the variance in knowledge sharing. However, contrary to the study's expectations, several hypotheses related to the impact of organizational factors on the extent of knowledge sharing are not supported. IT support, innovation culture, reward systems and management support were not significant in the whole population. Such findings are surprising and contradict the findings reported in most previous studies, though , the study of Rad and his colleagues (2011), which investigates the influence of individuals and organizational factors on knowledge sharing in one Iranian companies, also concludes with no significant direct effect of ICT, organizational culture or structure.

The following sections explore the underlying reasons for such contradictory results for every relationship.

6.3.1.1 IT

First, the study in hand finds that the mere practice of providing and encouraging the use of IT tools for knowledge sharing does not indicate any influence on the extent of knowledge sharing among individuals. Surprisingly, this is also the case when this relationship is tested in the context of communities of practice. This result is contrary to the results of several studies, such as Tohidinia and Mosakhani's (2010) study in the Iranian context, and some studies in other contexts (Lin, 2007; Rhodes et al., 2008; Choi et al., 2010). However, the finding is in line with those of Gholipour et al. (2010) and Rad

and his colleagues (2011). These research studies were conducted in the Iranian context but with different industries. These studies are also unable to justify IT usage and tools as a predictor for knowledge sharing.

The reason for such results of current study may be due to the lack of sufficient skill or familiarity with IT facilities with regard to knowledge sharing. Further analysis indicates that the relationship between IT usage and knowledge sharing is significant among younger employees (those below 36 years), and is not significant among seniors (36 and over). The reason might be the non-familiarity of senior managers with IT tools, along with lower educational levels, as this finding is supported by a recent study in the Iranian manufacturing context (Akhavan et al., 2012). However, further statistical analysis carried out in various combinations across the four industries – banks, insurance, investment and pharmaceutical – shows that IT tools have a significant impact on knowledge sharing between banks and insurance firms and between banks and investment institutions. It is useful to mention that in both combinations more than 53 percent of the population was under 36 years.

More analysis could support the idea that knowledge sharing might take place through face-to-face interaction. Such interaction may happen formally in meetings and informally during lunchtimes and coffee breaks. Most respondents – middle managers - of the study stated that their community of practice is an internal community (85.5 %) and is even within their current department (71 %). This inadvertently limits their dependence on an IT infrastructure to communicate and, in fact, they may be more comfortable establishing contact personally and not through IT tools.

6.3.1.2 Innovation culture

Next, hypotheses 2a and 3a, which relate to innovation culture, are also not supported among the whole study population. Further analysis shows that innovation culture is a predictor for knowledge sharing in the financial industry, which includes banks, insurances and investment institutions. It seems that merging pharmaceutical data which belongs to manufacturing sector with data from the three industries which are service sector makes the effect non-significant. The underlying reason might be the different nature of innovation strategy and culture in the service and manufacturing sectors (Ettlie and Rosenthal, 2011).

6.3.1.3 Organizational structure

The next finding of the study is that a flexible organizational structure improves the extent of knowledge sharing. This finding is consistent with the results reported in previous studies conducted in the Iranian context (e.g., Gholipour et al, 2010) and other contexts (e.g., Al-Alawi et al., 2007; Willem & Buelens, 2009). In the current study, flexible organizational structure is defined as the level of employee participation in decision-making, the ease of information flow and the use of cross-functional teams for certain tasks (Al-Alawi et al., 2007). As discussed during the development of this hypothesis, these dimensions undeniably facilitate knowledge sharing. This is especially so in the Iranian culture. Ease of information flow may help reduce uncertainty and further encourage employees to share knowledge.

6.3.1.4 Reward systems

Besides the above-mentioned factors, reward is also proposed as an enabler for knowledge sharing within Iranian firms. It was hypothesized that individuals are more willing to share their knowledge when their efforts are rewarded accordingly. However, this hypothesis is not substantiated in this study.

This finding is in line with the findings of Tohidnia and Mosakhani's (2010) study; however, extending the analysis to between junior (below 36 years old) and senior (36 years and over) middle managers reveals that the impact of reward systems on knowledge sharing was significant among seniors, while the younger generation showed less interest in rewards. Generally speaking, this difference between younger and elder employees is reasonable. For younger individuals, a successful career and job security are more important than monetary rewards (Hall, 2001), whereas older employees have already found their position and seem to be more interested in being rewarded for what they know, have gained and can share.

6.3.1.5 Management support

Finally, management support is proposed as an enabler of knowledge sharing. It is assumed that management needs to be aware of the importance of knowledge sharing and must present this awareness in their actions, speech and conversations. In addition, necessary resources should be provided to enable knowledge sharing (Wee, 2012b). Unexpectedly, this premise is not supported in the study. The result is not consistent with

prior empirical investigations and assertions in exploratory studies (e.g., Lin, 2007; Zboralski, 2009).

However, further statistical analysis using different combination of industries showed a significant impact of management support on knowledge sharing in a population that includes banking and insurance firms only. In the other samples analyzed, and in the main sample, support and encouragement alone by management staff is not perceived as a driving force to share knowledge. Individual employees expect managers to 'walk the talk' and display knowledge-sharing behaviour as well (Akhavan et al., 2005). The display of such behaviour encourages them to emulate this behaviour. In addition, it seems that the general support of knowledge sharing might not be sufficient; but there is a need for top management to clarify the types of knowledge more important to the company and that need to be shared (Kazemi and Allahyari, 2010).

In summary, among these knowledge-sharing enablers, only organizational structure indicates a significant impact on knowledge sharing in the whole population. Though other predictors (IT tools, innovation culture, management support, and reward system) show no significant effect in the main sample, they have shown to have an impact on knowledge sharing in different contexts. Table 6.1 shows the differences on different populations.

6.3.2   Knowledge Sharing Effect on Innovation Capability

As hypothesized, the influence of knowledge sharing on innovation capability is evident in this study. Knowledge sharing indicates a positive impact on both exploratory and exploitative innovations. To be innovative, it is necessary for individuals within an

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organization to share any new knowledge they learn. Intellectual stimulation takes place through the acquisition of knowledge from others (knowledge collecting) as well.

When there is an increased supply of knowledge within the organization through knowledge sharing, there are more possibilities of knowledge creation (Nonaka and Takeuchi, 2007) and the development of new ideas, processes, products or services (Lin, 2007). In other words, the more knowledge shared, the greater the opportunity for the development of novel ideas and knowledge creation (Kamasak and Bulutlar, 2010). As a result, innovation is born through knowledge creation (Nonaka and Takeuchi, 2007).

6.3.3   Social Capital's Moderating Effect on Organizational Factors

In addition to the direct relationships discussed above, this study also set out to test the moderating effect of the social capital of communities of practice on a knowledge-sharing research framework. The current study proposes that, to some extent, the level of social capital intervenes in the organizational enablers of knowledge sharing. It is hypothesized that the influence of these enablers on the extent of knowledge sharing can be influenced by the level of social capital. Using the results of the data analysis, the findings of the study on this issue are discussed below.

Based on Henseler and Fassott's (2010) thorough article, "Testing moderating effects in PLS path", the moderating effects of social capital can be estimated in a couple of ways. Briefly, there are two main approaches; product (interaction) terms and group comparisons. Under 'product terms', two procedures determine the moderating effects;

calculating the path coefficients of interaction terms, and comparing the proportion of variance explained (R^2) of the main effect model with the R^2 of the full model (Henseler and Fassott, 2010). The main model includes moderating variables as an exogenous variable. According to Cohen (1988, pp. 410–414), cited by Henseler & Fassott (2010), the effect size can be calculated with the following formula:

$$f^2 = \frac{R^2_{\text{model with moderator}} - R^2_{\text{model without moderator}}}{1 - R^2_{\text{model with moderator}}}$$

Knowledge sharing R^2 without a moderating effect is 0.550. This R^2 is different from that in the direct effect model (Figure 5.1), where the social capital dimensions were not present. According to Henseler and Fassott (2010), the main effect model should include the moderator variable as an independent variable. Calculating effect size (f^2) from the above-mentioned formula using change of variance explanation, we reach an amount of 0.174. An effect size above 0.15 supports a moderating effect with a moderate level. Thus, based on the R^2 change in the whole population, the interaction effects of social capital with organizational enablers of knowledge sharing have been supported in the studied context.

In the following section, the researcher discusses the results one by one hypothesis based on T-value method.

6.3.3.1 IT

The study assumes that the interaction of IT with the structural social capital of communities of practice will enhance the extent of knowledge sharing. It is posited that when members of communities of practice are close to each other and their connection is closely knit, the use of IT tools for knowledge sharing will be more prevalent. In other words, higher levels of structural social capital will enhance the effect of IT tools on knowledge sharing. However, the findings of this study, based on the interaction's path coefficient, manifests that the interaction between structural social capital and individuals' use of IT tools has no significant effect on the extent of knowledge sharing. A reason could be the characteristics of the population which, in the context the data has been collected, are communities of practice. The data reports that more than 85 percent of communities are bonded within related organizations, and over 70 percent of respondents identified their community as their department. A department (a limited and internal community) with strong network ties can be the reason individuals might find face-to-face communication more effective than technological communication for knowledge sharing.

6.3.3.2 Innovation culture

Similar results are obtained when testing the moderating effect of structural social capital on the relationship between innovation culture (innovation intention and innovation infrastructure) and knowledge sharing within a community of practice. It is assumed that the more connectivity and interaction between community members, the greater the effect of innovation culture on knowledge sharing. However, the results of this study, based on

the interaction's T-value, indicate otherwise. A reason for this might be that, by itself, close interaction and connectivity does not necessarily enhance innovative culture. The results of this study indicate that the presence of greater connectivity does not necessarily translate into innovative culture. High connectivity does not indicate the presence of required knowledge within the community context, which in turn enhances the innovative culture of an organization. The same applies to the interaction between innovation infrastructure and structural social capital. The interaction path coefficient of innovation infrastructure with structural social capital is 0.289. Although there are more connections between individuals and community members and more expectation to develop new skills and knowledge, it seems that learning might happen outside the community or individually.

6.3.3.3 Organizational structure

Next, it is assumed that structural social capital may play a moderating role in the relationship between organizational structure and knowledge sharing. It is hypothesized that the closeness of community members can enhance the effect of a flexible organization culture on knowledge sharing. Based on T-value obtained from the bootstrapping method, even though the path coefficient value is -0.205, the hypothesis is not substantiated. It seems that a flexible organizational culture facilitates relationship building among members through collaboration and participation. The role of structural social capital therefore appears to be redundant. This unexpected result might be due to differences in the organizational culture of Iranian organizations. However, on further analysis to note

any difference in the various combinations of industries, the interaction was found to be significant in a population that includes banks and insurance and investment institutions (the financial industry). One might conclude that the different nature of the business and the organizational culture of pharmaceutical firms manipulates the data, and causes a non-significant result across the whole sample.

6.3.3.4 Reward system

The next hypothesis – the moderating role of relational social capital of communities of practice on the relationship between reward system and knowledge sharing – is also not substantiated. This intervening effect is hypothesized based on the social exchange theory. It is assumed that facets of relational social capital (mutual trust, shared norms and obligations) can facilitate knowledge sharing in a community context without the presence of an organizational and official reward system (Bartol and Srivastava, 2002; Bock and Kim, 2002). However, the relationship is not strong enough to be significant. It can be pointed out that combining monetary and non-monetary rewards in this study in one construct may have influenced the outcome of this hypothesis testing; we posit that the generalized conceptualization of a reward system fails to capture the intricacies of the interaction between relational social capital and reward systems. However, this assumption needs to be verified in future studies. Also, the interaction path coefficient is quite small – -0.065.

Although in this study relational social capital does not moderate the effect of reward systems, the direct impact of this form of social capital on the extent of knowledge sharing

is significant, with a path coefficient of 0.424 at p<0.01 level. This implies that relational social capital, which includes trust, shared norms, obligation and commitment, is a strong predictor of knowledge sharing. In conclusion, knowledge sharing in the Iranian context appears to be explained by the social exchange theory, with community members building their knowledge-sharing practices through mutual trust, commitment, shared norms and obligation.

6.3.3.5 Management support

Finally, it was hypothesized that when there is a high level of structural social capital, individuals rely more on support from members of the community of practice than on management support. This hypothesis is not supported in the whole population. As with organizational structure, the interaction of management support with structural social capital in the financial industry is found to be significant.

6.3.4   Social Capital Moderating Effect on Knowledge Sharing and Innovation Capability

This section reviews the results of the moderating effect of the last dimension of social capital – cognitive social capital. This dimension has not received much attention in past studies. Similarly, the potential moderating influence of this dimension of social capital on the relationships between the knowledge-sharing enabler and knowledge sharing is not evident in this study. However, this study hypothesizes that cognitive social capital could moderate the relationship between knowledge sharing and innovation capability.

Cognitive social capital includes two sub-dimensions; shared language among community of practice members and the use of stories and language for knowledge sharing. It is assumed that with more shared language, along with story and narrative usage for knowledge sharing, more knowledge can be shared within the community context. Subsequently, this could lead to greater heights of innovation.

As conjectured, the direct effects of knowledge sharing on exploratory and exploitative innovation are significant. However, checking the T-value, only common language is found to moderate the effect of knowledge sharing on exploitative innovation. In the same way, story and narrative usage does not show a significant interaction effect with knowledge sharing in influencing either form of innovation capability. The same result is evident for interaction of shared language and knowledge sharing on exploratory innovation. At the same time, by checking the R^2 change to determine if there is a moderating effect, the results support a moderate effect for story and narrative usage and knowledge sharing on exploitative innovation. Its f^2 is over 0.15, which is a moderate level (Henseler and Fassott, 2010).

In summary, cognitive social capital indicates a moderating effect between knowledge sharing and exploratory innovation. Shared language facilitates the understanding of existing knowledge and fostered interactions on a familiar platform. Telling and sharing stories within a community of practice allows members to operate within a similar frame of thought and improves existing products, service and/or processes. However, similar results are not evident in the case of exploratory innovation. This form of innovation capability involves a diversion from the norm. It seems that cognitive social capital is only

able to facilitate knowledge sharing within a comfort zone. It has failed to trigger the 'out of the box' thinking required for exploratory innovation.

6.4 Limitation of This Study

In the best interests of establishing the validity of this study, steps were taken to mitigate potential threats. Care was taken to ensure that procedures for the distribution and collection of questionnaires were standardized. The researcher personally distributed, collected and entered the data; therefore, any mistreatment of reliability implementation is minimal. To minimize common method variance, the questions for respondents of dependent and independent variables were separated and responded to by different group of respondents. Two top managers responded to questions about their firm's innovation capability whereas five middle managers from the same firm answered questions regarding organizational support for knowledge sharing, the extent of knowledge sharing and social capital. However, this study is not without limitations.

First, this study selected only financial and pharmaceutical industries as knowledge-intensive firms. Firms from these industries were chosen because intense competition demands they invest in innovation as a 'winning weapon' and to gain competitive advantage. It is acknowledged that other industries, such as software and nano-industries, could have been selected as the target population of this study. However, due to the limited number of companies from other knowledge-intensive industries on the Tehran stock market list, they were not included.

Next, , the question of whether the findings can be generalized to other settings (i.e., times, places, industries) is an important concern in all research. This study focuses on Iranian knowledge-intensive firms of a particular type, which limits the ability of the findings to be generalized to other research settings; that are, other individuals in other industries.

6.5   Future Directions of the Study

The aforementioned limitations and findings for this study provide foundations for future research directions. One future direction is to improve the generalization of the integrative model. As we attribute the findings of this study to the business context of Iran, it is too early to conclude that this research framework is not viable. More studies are needed to validate the findings of this study. This can be done by applying the integrative model in different contexts, providing the opportunity to test the robustness of the model across cultural boundaries and against different backgrounds. The interaction effects of social capital can be used to investigate the influence of communities of practice on knowledge sharing and innovation capability in different countries with different cultural orientations. Furthermore, other knowledge-intensive industries or departments can be alternatively selected as the target population. Testing the integrative model in other settings would further confirm the validity and robustness of the integrative model.

The current study attempts only to investigate some important organizational enablers of knowledge sharing from an organizational perspective. Iranian knowledge-intensive firms need to consider other variables and test the moderating role of social capital in this culture specific framework.

6.6   Contributions and Implications of the Study

The findings from this study reveal several theoretical contributions and managerial implications. The following sub-sections discuss each area in turn.

6.6.3   Theoretical Contributions

First, this study develops and tests an updated new model in a new context. The results of the study show the impact of different businesses and cultural contexts. The established organizational enablers of knowledge sharing in other countries do not indicate an important role in Iranian Knowledge-intensive firms. This indicates that it is important to consider contextual influence when identifying knowledge-sharing enablers. Models and strategies employing generic enablers are definitely not the way forward. Review of the literature should be conducted with due consideration to contextual influence.

Second, the current study addresses and investigates the impact of enablers of knowledge sharing in the context of communities of practice. Furthermore, analyses were conducted to determine the moderating effect of social capital. Although interaction effects were only partially supported by the data, significant improvement on the variance explanation justifies the underlying influence of social capital. In fact, the findings of this study indicate that social capital holds the potential to serve as a substitute/moderator to these knowledge-sharing enablers, especially in the Iranian context.

Third, the holistic view – of seeing either all these variables together or including all dimensions – is scarce. For example, in most previous research regarding the social capital

dimensions of communities of practice, a single dimension (either structural or relational) was considered, and only in limited studies were both dimensions discussed – but not in the cognitive case. The current study uses the three dimensions of social capital and investigates their moderating effects in different relationships. However, based on the literature review, it appears that structural dimensions play a more important role than other dimensions.

6.6.4   Managerial Contribution

The results of this research reveal that the cultural context must be taken seriously by organizational leadership. Blindly following other studies from different cultures may not provide useful solutions in other contexts. The findings of this study indicate that some organizational factors that are strong enablers of knowledge sharing in one context may not be in another. The findings from this study will help Iranian practitioners know which enablers to focus on and invest in for their particular industries and demographics. The study supports the idea that KM practice is not general and must be aligned with business nature and strategy.

The study also highlights the importance of communities of practice and their social capital features. For example, as mostly reported by respondents, the majority of communities of practice are identified by internal boundaries and by their departments. This can be interpreted that organizational knowledge in this specific field is limited to organizational or departmental boundaries. This would be excellent human resource practice, as the

company retains the essential know-how and expertise in-house. This can inadvertently prevent knowledge loss and help establish competitive advantage.

6.7   Conclusion

In conclusion, this study introduces and develops an integrative model that combines knowledge-based and social capital models to investigate the extent of knowledge sharing and innovation capability. The research objectives claim that the influence of organizational knowledge-sharing enablers in the context of communities of practice may be moderated by the level of social capital of those communities of practice. Management's decision to support knowledge sharing might be modified by considering the social capital characteristics of the organization's communities of practice. In summary, the results justify the moderating role of social capital of communities of practice at a moderate level in Iranian knowledge-intensive firms.

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APPENDIX A1 – PILOT TEST QUESTIONNAIRE

Dear respected respondent

I am a PhD student in Knowledge Management (KM) at the University of Malaya. As partial fulfillment of the requirement for PhD and my thesis, I am planning to investigate the influence of organizational factors and community of practice on knowledge sharing and innovation capability of a firm.

We define community of practice as any formal or informal group which you seek, share or build your job related knowledge, it could be your own department group, or a specific community within or outside your organization that is related to your field of work.

I invite you to be one of the participants with providing response using your experience about work environment and culture of your company (or institution). I appreciate your taking of 10-15 minutes your time on completing this questionnaire.

All of the information will be kept confidential. No name or organization will be used on the research's final document.

In making you ratings, please remember the following points

1. Some of the question may appear to be similar, but they do address somewhat different issues. Please read each question carefully.
2. Make sure to answer all items- Please do not omit any.
3. Please, do not check more than one number on a single scale.

Thank you kindly for your consideration and cooperation.

Yours sincerely,

Ahmad Vazehi Ashtiani
PhD Candidate

If you have any enquiries please contact ahmad.vazehi@gmail.com

Section A: In this section, please answer the following questions about *__yourself__*. Please check only one answer in each part as required.

1. What section your company belongs to?

☐ Public   ☐ Private

2. What industry your company involved in?

☐ Manufacturing   ☐ Telecommunication   ☐ Education

☐ Banking and finance   ☐ Service   ☐ Other

How many years do you have work experiences?

☐ Less than one year   ☐ 1-5 years   ☐ 6-10 years

☐ 11-20 years   ☐ More than 20 years

3. What is your age?

☐ Under 25   ☐ 25-35   ☐ 36-45

☐ 46-50   ☐ above 50

4. What is your highest level of education?

☐ PhD or equivalent degree   ☐ Master   ☐ Bachelor

☐ Diploma   ☐ Primary/Secondary School

5. What is your gender?

☐ Female   ☐ Male

Section B: In this section we would like to know to what extent your company supports/facilitates knowledge sharing and innovational behaviour within the employees. Please select the numebr that corresponds to the extent of your perceptions for the followng questions*:

* E.D. stands for extremely disagree / * E.A. stands for extremely agree

Information Technology Support	E.D.				E.A.
Our company provides IT support for collaborative works	1	2	3	4	5

Our company provides IT support for communication among organization members	1	2	3	4	5
Our company provides IT support for sharing information & knowledge	1	2	3	4	5
The technological tools available at the organization for sharing knowledge are effective	1	2	3	4	5

Innovation Intention	E.D.				E.A.
My contributions are valued by my fellow employees	1	2	3	4	5
I understand how I contribute to innovation in our organization	1	2	3	4	5
There is trust and mutual respect currently between management and employees	1	2	3	4	5
Communications are open and honest	1	2	3	4	5
We have an effective environment for collaboration within and between departments	1	2	3	4	5
As an employee, I feel enabled to generate ideas	1	2	3	4	5
I feel obligated to help create the future for this organization	1	2	3	4	5
I am encouraged to challenge decisions and actions in this organization if I think there is a better way	1	2	3	4	5
Innovation is an underlying culture and not just a word	1	2	3	4	5
Our senior managers are able to effectively cascade the innovation message throughout the organization	1	2	3	4	5
This organization's management team is diverse in their thinking in that they have different views as to how things should be done	1	2	3	4	5
Innovation is a core value in this organization	1	2	3	4	5
There is a coherent set of innovation goals and objectives that have been articulated	1	2	3	4	5

Innovation Infrastructure	E.D.				E.A.
Everyone in our organization is involved in learning (training)	1	2	3	4	5
There is an expectation to develop new skills, capabilities and knowledge that is directed toward supporting innovation in this organization	1	2	3	4	5
I know what training/learning I need to engage myself in to support innovation	1	2	3	4	5
Continued organizational learning is encouraged	1	2	3	4	5

I consider myself to be a creative/innovative person	1	2	3	4	5
I view uncertainty as opportunity, and not as a risk	1	2	3	4	5
This organization uses my creativity to its benefit, that is, it uses it in a good way	1	2	3	4	5
I am given the time/opportunity to develop my creative potential	1	2	3	4	5
I am prepared to do things differently if given the chance to do so	1	2	3	4	5

Organizational Structure	E.D.				E.A.
We are empowered to apply what we have learned	1	2	3	4	5
We can take action without a supervisor	1	2	3	4	5
We are encouraged to make their own decisions	1	2	3	4	5
We can ignore the rules and reach informal agreements to handle some situations	1	2	3	4	5
Employees actively participate in the process of decision-making	1	2	3	4	5
Information flows easily throughout the organization regardless of employee roles or other boundaries	1	2	3	4	5
Certain tasks require the formation of teams with members from different departments in order to be accomplished	1	2	3	4	5

Reward System	E.D.				E.A.
We are rewarded for sharing our knowledge and experience with our colleagues	1	2	3	4	5
The knowledge sharing rewards available are effective in motivating staff to spread their knowledge	1	2	3	4	5
Sharing my knowledge with colleagues should be rewarded with a higher salary	1	2	3	4	5
Sharing my knowledge with colleagues should be rewarded with a higher bonus	1	2	3	4	5
Sharing my knowledge with colleagues should be rewarded with a promotion	1	2	3	4	5
Sharing my knowledge with colleagues should be rewarded with an increased job security	1	2	3	4	5

Management Support	E.D.				E.A.
The management is aware of the importance of knowledge sharing	1	2	3	4	5
The management speaks positively to others about sharing of	1	2	3	4	5

knowledge and know-how					
Top managers always support and encourage employees to share their knowledge with colleagues	1	2	3	4	5
Top managers provide most of the necessary help and resources to enable employees to share knowledge	1	2	3	4	5
My supervisor supports expertise sharing	1	2	3	4	5
The management team acts as coaches and facilitators in support of communication	1	2	3	4	5
Managers possess the appropriate leadership qualities to support innovation	1	2	3	4	5

Section C: In this section we would like to know the extent of willingness of knowledge sharing in your organization. Please select a numebr that corresponds to the extent of your perceptions for the followng questions:

Knowledge sharing	E.D.				E.A.
When I have learned something new, I tell my colleagues about it	1	2	3	4	5
When they have learned something new, my colleagues tell me about it	1	2	3	4	5
Knowledge sharing among colleagues is considered normal in my company	1	2	3	4	5
I share information I have with colleagues when they ask for it	1	2	3	4	5
I share my skills with colleagues when they ask for it	1	2	3	4	5
Colleagues in my company share knowledge with me when I ask them to	1	2	3	4	5
Colleagues in my company share their skills with me when I ask them to	1	2	3	4	5

Innovation capability	E.D.				E.A.
Our unit accepts demands that go beyond existing products and services	1	2	3	4	5
We invent new products and services	1	2	3	4	5
We experiment with new products and services in our local market	1	2	3	4	5
We commercialize products and services that are completely new to our unit	1	2	3	4	5
We frequently utilize new opportunities in new markets	1	2	3	4	5
Our unit regularly uses new distribution channels	1	2	3	4	5

We frequently refine the provision of existing products and services	1	2	3	4	5
We regularly implement small adaptations to existing products and services	1	2	3	4	5
We introduce improved but existing products and services for our local market	1	2	3	4	5
We improve our provision's efficiency of products and services	1	2	3	4	5
Our unit expands services for existing clients	1	2	3	4	5

Section E: In this section we would like to know about the existing and characteristics of Community of practice within/outside of your organization in which you interacted the most during your employment in your organization/ work experiences as the same job.

- Is this community same as your work department?   Yes ---- No---
- Is this an online (Internet/Intranet) community?   Yes ---- No---

Please select a number that corresponds to the extent to which you agree or disagree with each of statement in relation to the Community of practice in which you interacted.

In my community of practice…	E.D.				E.A.
members know each other closely	1	2	3	4	5
members interacted very close to each other	1	2	3	4	5
members interacted frequently with other members	1	2	3	4	5
members could directly access any other member	1	2	3	4	5
most members knew each other before they joined this community	1	2	3	4	5
most members were acquaintances of each other	1	2	3	4	5
most members I interacted with were known to me before I joined this community	1	2	3	4	5

In my community of practice…	E.D.				E.A.
members were expected to have a team spirit	1	2	3	4	5
members were expected to be cooperative	1	2	3	4	5
members were expected to have an open mind	1	2	3	4	5
members were expected to share what they knew	1	2	3	4	5
members trusted each other enough to share all relevant information	1	2	3	4	5
members believed that all members were acting in good faith	1	2	3	4	5

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members were confident they could trust each other	1	2	3	4	5
members relied on each other for the truthfulness of the information shared	1	2	3	4	5
members had a strong sense of belonging to the community	1	2	3	4	5
members identified with each other as one community	1	2	3	4	5
members cared for other members' well being	1	2	3	4	5
members expected others to help them when they helped	1	2	3	4	5
members were expected to return favors	1	2	3	4	5

In my community of practice…	E.D.				E.A.
members used a common language	1	2	3	4	5
the terms used by members were known to most of us	1	2	3	4	5
we had our own common words to communicate ideas and Codes	1	2	3	4	5
members used technical terms common among us	1	2	3	4	5
members used stories to communicate subtle ideas	1	2	3	4	5
stories and narratives were used to communicate rich sets of ideas	1	2	3	4	5
stories and metaphors were used to create and preserve rich meaning	1	2	3	4	5
stories and narratives were used to share hard to communicate ideas	1	2	3	4	5

Dear respected respondent

I am a PhD student in Knowledge Management (KM) at the University of Malaya. As partial fulfillment of the requirement for PhD and my thesis, I am planning to investigate the relationship between organizational factors, community of practice, knowledge sharing , and innovation capability of a firm.

We define community of practice as any formal or informal group which you seek, share or build your job related knowledge, it could be your own department group, or a specific community within or outside your organization that is related to your field of work.

I invite you to be one of the participants with providing response using your experience about work environment and culture of your company (or institution). I appreciate your taking of 10-15 minutes your time on completing this questionnaire.

All of the information will be kept confidential. No name or organization will be used on the research's final document.

In making you ratings, please remember the following points

4. Some of the question may appear to be similar, but they do address somewhat different issues. Please read each question carefully.
5. Make sure to answer all items- Please do not omit any.
6. Please, do not check more than one number on a single scale.

Thank you kindly for your consideration and cooperation.

Yours sincerely,

Ahmad Vazehi Ashtiani
PhD Candidate

If you have any enquiries please contact vazehi@perdana.um.edu.my

Section A: In this section, please answer the following questions about *yourself*. Please check only one answer in each part as required.

1. What section your company belongs to?

   ☐ Public   ☐ Private

2. What industry your company involved in?

   ☐ Banking   ☐ Pharmecutical

   ☐ Insurance   ☐ Finance/Leasing

3. How many years do you have work experiences?

   ☐ Less than one year   ☐ 1-5 years   ☐ 6-10 years

   ☐ 11-20 years   ☐ More than 20 years

4. What is your age?

   ☐ Under 25   ☐ 25-35   ☐ 36-45

   ☐ 46-50   ☐ above 50

5. What is your highest level of education?

   ☐ PhD or equivalent degree   ☐ Master   ☐ Bachelor

   ☐ Diploma   ☐ Primary/Secondary School

6. What is your gender?

   ☐ Female   ☐ Male

Section B: In this section we would like to know to what extent your company supports/facilitates knowledge sharing and innovational behaviour within the employees. Please select the numebr that corresponds to the extent of your perceptions for the followng questions*:

* E.D. stands for extremely disagree / * E.A. stands for extremely agree

	E.D.				E.A.
Our company provides IT support for collaborative works	1	2	3	4	5
Our company provides IT support for communication among	1	2	3	4	5

organization members					
Our company provides IT support for searching for and accessing necessary information	1	2	3	4	5
The technological tools available at the organization for sharing knowledge are effective	1	2	3	4	5

	E.D.				E.A.
As an employee, I feel enabled to generate ideas	1	2	3	4	5
I feel that I am trusted to act in the organization's best interests with minimal supervision	1	2	3	4	5
I am encouraged to challenge decisions and actions in this organization if I think there is a better way	1	2	3	4	5
We have an effective environment for collaboration within and between departments	1	2	3	4	5
Communications are open and honest	1	2	3	4	5
Innovation is an underlying culture and not just a word	1	2	3	4	5
Innovation is a core value in this organization	1	2	3	4	5
We have an innovation vision that is aligned with projects, platforms, or initiatives	1	2	3	4	5
Our senior managers are able to effectively cascade the innovation message throughout the organization	1	2	3	4	5
There is a coherent set of innovation goals and objectives that have been articulated	1	2	3	4	5

	E.D.				E.A.
The training I receive is directed at helping me deliver customer value	1	2	3	4	5
There is an expectation to develop new skills, capabilities and knowledge that is directed toward supporting innovation in this organization	1	2	3	4	5
Continued organizational learning is encouraged	1	2	3	4	5
There is mentorship and post-training support	1	2	3	4	5
This organization uses my creativity to its benefit, that is, it uses it in a good way	1	2	3	4	5
I am prepared to do things differently if given the chance to do so	1	2	3	4	5
Innovation in our organization is more likely to succeed if employees are allowed to be unique and express this uniqueness in their daily activities	1	2	3	4	5

I view uncertainty as opportunity, and not as a risk	1	2	3	4	5

	E.D.				E.A.
Employees actively participate in the process of decision-making	1	2	3	4	5
Information flows easily throughout the organization regardless of employee roles or other boundaries	1	2	3	4	5
Certain tasks require the formation of teams with members from different departments in order to be accomplished	1	2	3	4	5
Employees are treated as equals amongst peers, and this is evident in their participation levels	1	2	3	4	5

	E.D.				E.A.
We are rewarded for sharing our knowledge and experience with our colleagues	1	2	3	4	5
We are rewarded for sharing our knowledge with colleagues with monetary reward like higher salary or bonus	1	2	3	4	5
We are rewarded for sharing our knowledge with colleagues with non-monetary reward like job promotion or increased job security	1	2	3	4	5
My organization has a standardized reward system for sharing knowledge	1	2	3	4	5
The level of reward I already received for knowledge sharing influences my intention to share knowledge afterward.	1	2	3	4	5

	E.D.				E.A.
The management is aware of the importance of knowledge sharing	1	2	3	4	5
Top managers think that encouraging knowledge sharing with colleagues is beneficial	1	2	3	4	5
Top managers provide most of the necessary help and resources to enable employees to share knowledge	1	2	3	4	5
Top managers always support and encourage employees to share their knowledge with colleagues	1	2	3	4	5

Section C: In this section we would like to know the extent of willingness of knowledge sharing in your organization. Please select a numebr that corresponds to the extent of your perceptions for the followng questions:

	E.D.				E.A.
When I have learned something new, I tell my colleagues about it	1	2	3	4	5

When they have learned something new, my colleagues tell me about it	1	2	3	4	5
Knowledge sharing among colleagues is considered normal in my company	1	2	3	4	5
I share information I have with colleagues when they ask for it	1	2	3	4	5
I share my skills with colleagues when they ask for it	1	2	3	4	5
Colleagues in my company share knowledge with me when I ask them to	1	2	3	4	5
Colleagues in my company share their skills with me when I ask them to	1	2	3	4	5

	E.D.				E.A.
Our unit accepts demands that go beyond existing products and services	1	2	3	4	5
We invent new products and services	1	2	3	4	5
We experiment with new products and services in our local market	1	2	3	4	5
We commercialize products and services that are completely new to our unit	1	2	3	4	5
We frequently utilize new opportunities in new markets	1	2	3	4	5
We frequently refine the provision of existing products and services	1	2	3	4	5
We regularly implement small adaptations to existing products and services	1	2	3	4	5
We introduce improved but existing products and services for our local market	1	2	3	4	5
We improve our provision's efficiency of products and services	1	2	3	4	5
Our unit expands services for existing clients	1	2	3	4	5

Section E: In this section we would like to know about the existing and characteristics of Community of practice within/outside of your organization in which you interacted the most during your employment in your organization/ work experiences as the same job.

- Is this community same as your work department?   Yes ---- No---

- Is this an online (Internet/Intranet) community?   Yes ---- No---

Please select a number that corresponds to the extent to which you agree or disagree with each of statement in relation to the community of practice in which you interacted.

In my community of practice…	E.D.				E.A.
members know each other closely	1	2	3	4	5
members interacted frequently with other members	1	2	3	4	5
members interact with many members	1	2	3	4	5
members could directly access any other member	1	2	3	4	5
most members knew each other before they joined this community	1	2	3	4	5
most members were acquaintances of each other	1	2	3	4	5
members were expected to have a team spirit	1	2	3	4	5
members were expected to be cooperative	1	2	3	4	5
members were expected to have an open mind	1	2	3	4	5
members were expected to share what they knew	1	2	3	4	5
members trusted each other enough to share all relevant information	1	2	3	4	5
members believed that all members were acting in good faith	1	2	3	4	5
members were confident they could trust each other	1	2	3	4	5
members relied on each other for the truthfulness of the information shared	1	2	3	4	5
members had a strong sense of belonging to the community	1	2	3	4	5
members identified with each other as one community	1	2	3	4	5
members cared for other members' well being	1	2	3	4	5
members expected others to help them when they helped	1	2	3	4	5
members were expected to return favors	1	2	3	4	5
members used a common language	1	2	3	4	5
the terms used by members were known to most of us	1	2	3	4	5
we had our own common words to communicate ideas and Codes	1	2	3	4	5
members used technical terms common among us	1	2	3	4	5
members used stories to communicate subtle ideas	1	2	3	4	5
stories and narratives were used to communicate rich sets of ideas	1	2	3	4	5
stories and metaphors were used to create and preserve rich meaning	1	2	3	4	5
stories and narratives were used to share hard to communicate ideas	1	2	3	4	5

APPENDIX B – AGREEMENT TEST

	IT	Org Constituency	Org Learning	Creativity	Innovation propensity	Org Structure	Reward system	Mgt support	knowledge sharing	Structural SC	Relational SC	Cognitive SC	Agreement issues	
													Middle managers	Top managers
Org.01	0.77	0.94	0.85	0.67	0.90	0.84	0.88	0.92	0.95	0.93	0.97	0.85		
Org.02	0.97	0.95	0.91	0.87	0.92	0.86	0.88	0.89	0.84	0.80	0.94	0.93		
Org.03	0.88	0.94	0.97	0.97	0.96	0.94	0.89	0.88	0.95	0.95	0.98	0.93		
Org.04	0.99	0.82	0.81	0.91	0.87	0.74	0.91	0.91	0.95	0.93	0.94	0.92		
Org.05	0.91	0.98	0.98	0.92	0.95	0.94	0.79	1.00	0.98	0.85	0.99	0.93		
Org.06	0.99	0.94	0.95	0.98	0.97	0.91	0.97	0.97	0.94	0.97	0.98	0.94		
Org.07	0.87	0.99	0.71	0.79	0.96	0.94	0.81	0.92	0.98	0.76	0.92	0.84		
Org.08	0.69	0.89	0.80	0.75	0.80	0.85	0.88	0.85	0.90	0.76	0.91	0.73		
Org.09	0.89	0.91	0.71	0.71	0.83	0.72	0.77	0.86	0.93	0.79	0.91	0.92		
Org.10	0.68	0.77	0.89	0.72	0.71	0.71	0.93	0.80	0.93	0.93	0.99	0.98		
Org.11	0.71	0.76	0.97	0.97	0.73	0.94	0.71	0.87	0.93	0.77	0.93	0.96		
Org.12	0.87	0.90	0.83	0.90	0.92	0.83	0.91	0.88	0.87	0.91	0.97	0.94		
Org.13	0.80	0.73	0.57	0.59	0.64	0.82	0.86	0.74	0.81	0.74	0.94	0.89		
Org.14	0.72	0.88	0.93	0.81	0.89	0.87	0.89	0.92	0.93	0.93	0.97	0.94		
Org.15	0.91	0.96	0.87	0.92	0.77	0.90	-0.45	0.92	0.97	0.87	0.98	0.91	1.00	
Org.16	0.86	0.76	0.92	0.91	0.90	0.57	0.83	0.81	0.66	0.60	0.86	0.82		
Org.17	0.75	0.91	0.83	0.85	0.93	0.92	0.75	0.90	0.96	0.84	0.98	0.85		
Org.18	0.77	0.70	0.88	0.77	0.87	0.78	0.94	0.84	0.85	0.73	0.91	0.88		
Org.19	0.95	0.74	0.83	0.83	0.97	0.93	0.77	0.87	0.85	0.94	0.98	0.90		
Org.20	0.69	0.76	0.60	0.75	0.79	0.72	0.75	0.60	0.75	0.74	0.94	0.66		
Org.21	0.67	0.76	0.91	0.50	0.60	0.72	#DIV/0!	0.79	0.95	0.90	0.95	0.94	1.00	

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Org.22	0.58	0.78	0.76	0.50	0.57	0.93	0.88	0.79	0.77	0.94	0.96	0.57		
Org.23	0.50	0.51	0.86	0.83	0.60	0.82	0.80	0.79	0.89	0.88	0.94	0.82		
Org.24	0.50	0.63	0.56	0.79	0.86	0.79	0.78	0.60	0.97	0.77	0.99	0.92		
Org.25	0.76	0.82	0.65	0.54	0.76	0.77	0.93	0.80	0.77	0.79	0.93	0.52		
Org.26	0.84	0.76	0.75	0.88	0.69	0.89	0.86	0.60	0.88	0.89	0.95	0.95		
Org.27	0.94	0.94	0.80	0.89	0.97	0.87	0.93	0.85	0.96	0.94	0.95	0.80		
Org.28	0.90	0.87	0.72	0.74	0.79	0.86	0.82	0.74	0.76	0.88	0.94	0.94		
Org.29	0.88	0.94	0.95	0.96	0.94	0.95	0.97	0.96	0.91	0.68	0.97	0.71		
Org.30	0.57	0.81	0.71	0.67	0.68	0.73	0.71	0.67	0.85	0.89	0.94	**-0.89**	1.00	
Org.31	0.89	0.77	0.97	0.87	0.94	0.50	0.81	0.89	0.98	0.59	0.98	0.87		
Org.32	0.84	0.93	0.95	0.89	0.91	0.90	0.98	0.96	0.97	0.90	0.97	0.92		
Org.33	0.74	0.77	0.72	0.85	0.89	0.85	0.79	0.86	0.91	0.89	0.86	0.96		
Org.34	0.97	0.88	0.97	0.89	0.90	0.92	0.68	0.74	0.96	0.90	0.98	0.94		
Org.35	0.50	0.79	0.92	0.88	0.88	0.91	0.63	0.77	0.89	0.85	0.95	0.75		
Org.36	0.91	0.91	0.52	0.77	0.76	0.50	0.78	0.76	0.73	0.85	0.88	0.93		
Org.37	0.81	0.76	0.96	0.89	0.87	0.93	0.88	0.92	0.77	0.93	0.96	0.95		
Org.38	0.74	0.88	0.67	0.85	**-0.45**	0.67	0.81	0.71	0.81	0.63	0.93	0.90	1.00	
Org.39	**0.34**	0.66	0.86	0.86	0.81	0.91	**0.31**	0.51	0.82	**0.35**	0.64	0.73	1.00	1.00
Org.40	0.90	0.88	0.83	0.86	0.83	0.89	0.94	0.83	0.95	0.78	0.96	0.79		
Org.41	0.92	0.89	0.63	0.86	0.72	0.86	0.76	0.78	0.88	0.62	0.84	0.76	1.00	
Org.42	0.90	0.96	0.79	0.97	0.92	0.89	0.84	0.92	0.92	0.85	0.97	0.91		
Org.43	0.89	0.89	0.91	0.71	0.97	0.82	**0.43**	0.95	0.63	0.51	0.96	0.82	1.00	
Org.44	0.96	0.74	0.86	0.83	0.83	0.82	0.92	0.95	0.61	0.85	0.94	0.79		
Org.45	0.91	0.94	0.91	0.93	0.91	0.84	0.94	0.82	0.99	0.92	0.98	0.92		
Org.46	0.77	0.95	0.88	0.81	0.63	0.72	0.92	0.60	0.89	0.89	0.96	0.93		
Org.47	0.91	0.96	0.92	0.94	0.84	0.85	0.96	0.60	0.92	0.92	0.98	0.95		

Org														
Org.48	0.90	0.75	0.84	0.85	0.78	0.81	0.73	0.86	0.95	0.93	0.93	0.96		
Org.49	0.55	0.93	0.87	0.92	0.83	0.91	0.67	0.69	0.70	0.94	0.96	0.90	1.00	
Org.50	0.73	0.91	0.95	0.65	0.59	0.79	0.82	0.65	0.88	0.62	0.95	0.80	1.00	
Org.51	0.76	0.95	0.95	0.77	0.97	0.95	0.83	0.94	0.95	0.88	0.96	0.93		
Org.52	**0.48**	0.81	0.66	0.89	0.92	0.60	0.87	0.62	0.87	**0.30**	0.94	0.96	1.00	
Org.53	0.75	0.89	0.94	0.79	0.83	0.86	0.78	0.81	0.84	0.72	0.96	0.91		
Org.54	0.96	0.88	0.86	0.92	0.96	0.93	0.95	0.94	0.77	0.89	0.96	0.91		
Org.55	0.95	0.97	0.94	0.97	0.96	0.96	0.97	0.98	0.97	0.95	0.99	0.97		
Org.56	0.75	0.94	0.82	0.87	0.94	0.87	0.87	0.84	0.82	0.69	0.96	0.95		
Org.57	0.95	0.93	0.94	0.91	0.78	0.85	0.70	0.87	0.86	0.91	0.95	**0.74**		
Org.58	0.92	0.94	0.73	0.90	0.86	0.92	0.96	0.73	0.89	0.94	0.98	0.89		
Org.59	0.95	0.83	0.91	0.89	0.88	0.94	0.93	0.74	0.97	0.96	0.96	0.95		
Org.60	0.90	0.86	0.89	0.86	0.93	0.88	0.95	0.92	0.76	0.91	0.97	0.94		
Org.61	0.91	0.87	0.87	0.84	0.91	0.92	0.84	0.96	0.94	0.95	0.99	0.97		
Org.62	0.85	0.95	**0.34**	0.63	0.95	0.68	**0.31**	0.68	0.88	0.83	0.95	0.59		1.00
Org.63	0.92	0.85	0.88	0.92	0.94	0.81	0.95	0.73	0.94	0.95	0.97	0.95		
Org.64	0.96	0.93	0.94	0.72	0.85	0.89	0.85	0.93	0.90	0.82	0.96	**0.73**		
Org.65	0.97	0.95	0.95	0.98	0.95	0.77	**0.47**	0.95	0.88	0.97	0.99	0.95	1.00	
Org.66	0.92	0.96	0.80	0.89	0.92	0.95	0.85	0.89	0.89	0.79	0.96	0.88		
Org.67	**0.21**	0.95	0.98	0.90	0.99	0.92	0.86	0.80	0.82	0.96	0.94	0.94	1.00	
Org.68	0.72	0.89	0.80	0.93	0.78	0.71	0.71	0.79	0.68	0.92	0.79	0.90		
Org.69	0.90	0.80	0.87	0.85	0.88	0.91	0.84	0.99	0.92	0.96	0.99	0.91		
Org.70	0.92	0.94	0.76	0.75	0.71	0.87	0.93	0.79	0.91	0.75	0.97	0.89		
Org.71	0.95	0.56	0.80	0.87	0.87	0.70	0.79	0.67	0.89	0.83	0.95	0.85		
Org.72	0.92	0.68	0.80	0.71	0.68	0.82	0.88	0.71	0.74	0.49	0.94	0.89		
Org.73	0.85	**0.74**	0.88	0.90	0.83	0.77	0.78	0.88	0.83	0.81	0.96	0.70		

Org.74	0.88	0.86	0.88	0.79	0.91	0.93	0.85	0.97	0.90	0.93	0.99	0.85		
Org.75	0.96	0.64	0.88	0.88	0.91	0.91	0.86	0.90	0.88	0.94	0.94	0.91		
Org.76	0.87	0.71	0.79	0.79	0.76	0.85	0.86	0.83	0.85	0.82	0.97	0.87		
Org.77	0.76	0.71	0.84	0.84	0.81	0.73	0.57	0.88	0.92	0.92	0.97	**0.44**		1.00
Org.78	0.58	0.89	0.90	0.62	0.78	0.75	0.72	0.83	0.84	0.86	0.97	0.90		
Org.79	0.94	0.96	0.77	0.86	0.89	0.89	0.95	0.97	0.85	0.98	0.94	0.91		
Org.80	0.80	0.71	0.81	0.75	0.83	0.87	0.91	0.77	0.93	0.83	0.96	0.93		
Org.81	0.93	0.96	0.88	0.88	0.93	0.83	0.84	0.89	0.94	0.95	0.97	0.96		
Org.82	0.91	0.98	0.83	0.85	0.95	0.94	0.94	0.89	0.83	0.83	0.94	0.96		
Org.83	0.87	0.98	0.84	0.97	0.99	0.92	**0.21**	1.00	0.99	0.91	0.97	0.90	1.00	
Org.84	0.95	0.94	0.65	0.87	0.94	0.90	0.92	0.87	0.82	0.94	0.95	0.95		
Org.85	0.97	0.93	0.97	0.79	0.97	0.90	0.81	0.87	0.94	0.86	0.99	0.96		
Org.86	0.85	0.92	0.89	0.95	0.74	0.75	0.97	0.92	0.84	0.75	0.96	**0.70**		
Org.87	0.95	0.92	0.76	0.95	0.98	0.90	0.98	0.97	0.95	0.94	0.98	0.95		
Org.88	**0.48**	0.86	0.75	0.93	0.86	0.58	0.65	0.73	0.87	0.92	0.78	0.71	1.00	
Org.89	0.87	0.83	0.97	0.87	0.91	0.95	0.83	0.97	0.90	0.90	0.97	0.92		
Org.90	0.83	0.93	0.83	0.83	0.96	0.92	0.72	0.92	0.94	0.87	0.96	0.94		
Org.91	0.87	0.73	0.84	0.95	**#DIV/0!**	0.94	0.97	0.71	0.88	0.97	0.95	0.95	1.00	
Org.92	0.87	0.98	0.90	0.48	0.90	0.99	0.56	0.92	0.97	0.78	0.96	0.95		
Org.93	0.84	0.88	0.92	0.90	0.74	0.86	0.75	0.76	0.86	0.79	0.96	0.91		
Org.94	**0.00**	0.90	0.89	0.89	**0.15**	0.80	0.83	0.98	0.86	0.84	0.98	0.95	1.00	
Org.95	0.85	0.95	0.84	0.85	0.80	0.92	0.79	0.84	0.90	0.51	0.78	0.78		
Org.96	0.88	0.94	0.97	0.97	0.96	0.94	0.89	0.88	0.95	0.95	0.98	0.93		
Org.97	0.94	0.96	0.77	0.86	0.89	0.89	0.95	0.97	0.85	0.98	0.94	0.91		
Org.98	0.95	0.93	0.94	0.91	0.78	0.85	0.70	0.87	0.86	0.91	0.95	0.74		
Org.99	0.96	0.88	0.86	0.92	0.96	0.93	0.95	0.94	0.77	0.89	0.96	0.91		

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Org.100	0.77	0.70	0.88	0.77	0.87	0.78	0.94	0.84	0.85	0.73	0.91	0.88	
Org.101	0.88	0.94	0.95	0.96	0.94	0.95	0.97	0.96	0.91	0.68	0.97	0.71	
Org.102	0.99	0.82	0.81	0.91	0.87	0.74	0.91	0.91	0.95	0.93	0.94	0.92	
Org.103	0.60	0.95	0.70	0.81	0.73	0.80	0.77	0.83	0.93	0.67	0.96	0.96	
Org.104	0.92	0.96	0.80	0.89	0.92	0.95	0.85	0.89	0.89	0.79	0.96	0.88	
Org.105	0.75	0.91	0.83	0.85	0.93	0.92	0.75	0.90	0.96	0.84	0.98	0.85	
Org.106	0.75	0.89	0.94	0.79	0.83	0.86	0.78	0.81	0.84	**0.35**	0.96	0.91	1.00
Org.107	0.77	0.94	0.85	0.67	0.90	0.84	0.88	0.92	0.95	0.93	0.97	0.85	
Org.108	0.96	0.93	0.94	0.72	0.85	0.89	0.85	0.93	0.90	0.82	0.96	0.71	
Org.109	**0.21**	0.95	0.98	0.90	0.99	0.92	0.86	0.80	0.82	0.96	0.94	0.94	1.00
Org.110	0.97	0.95	0.91	0.87	0.92	0.86	0.88	0.89	0.84	0.80	0.94	0.93	
Org.111	0.95	0.94	0.87	0.87	0.94	0.90	0.92	0.87	0.82	0.94	0.95	0.95	
												18.00	3.00

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APPENDIX C – BOX PLOT

Outliers – Box plot figures
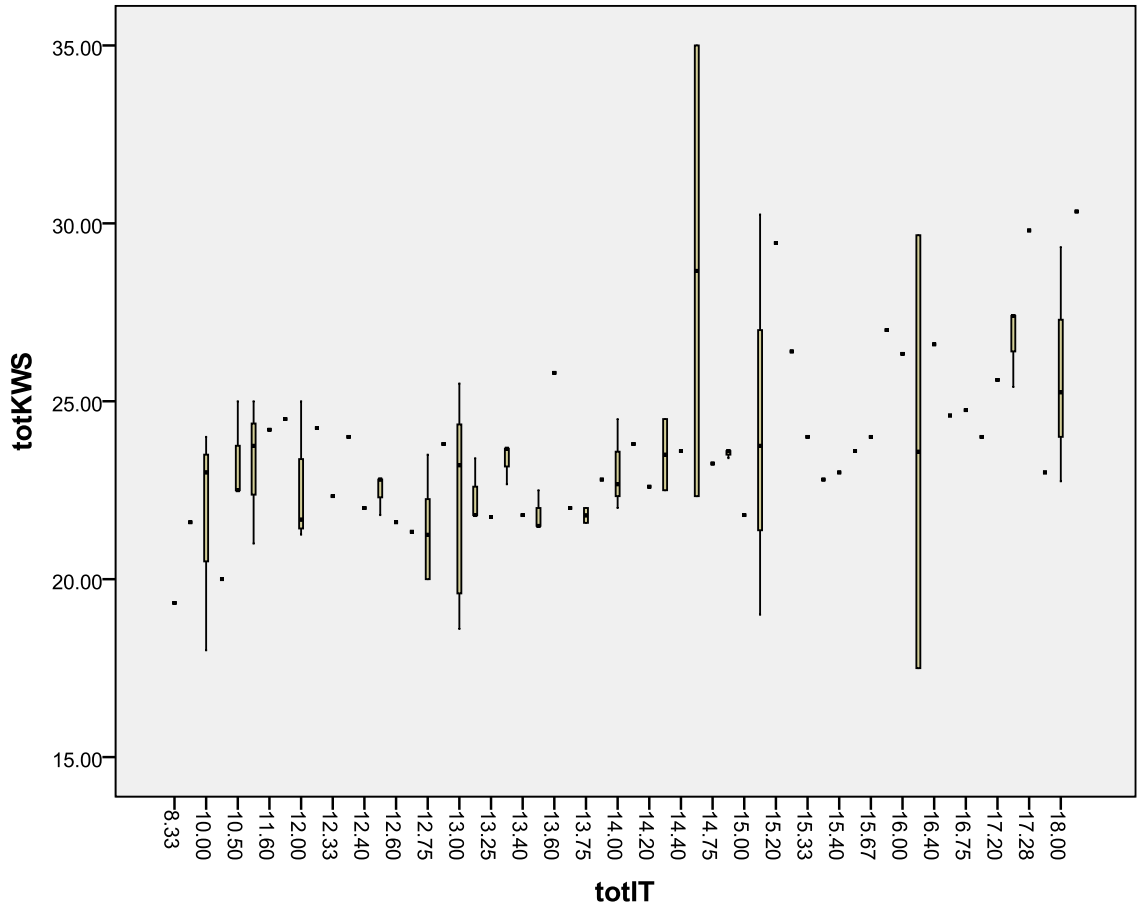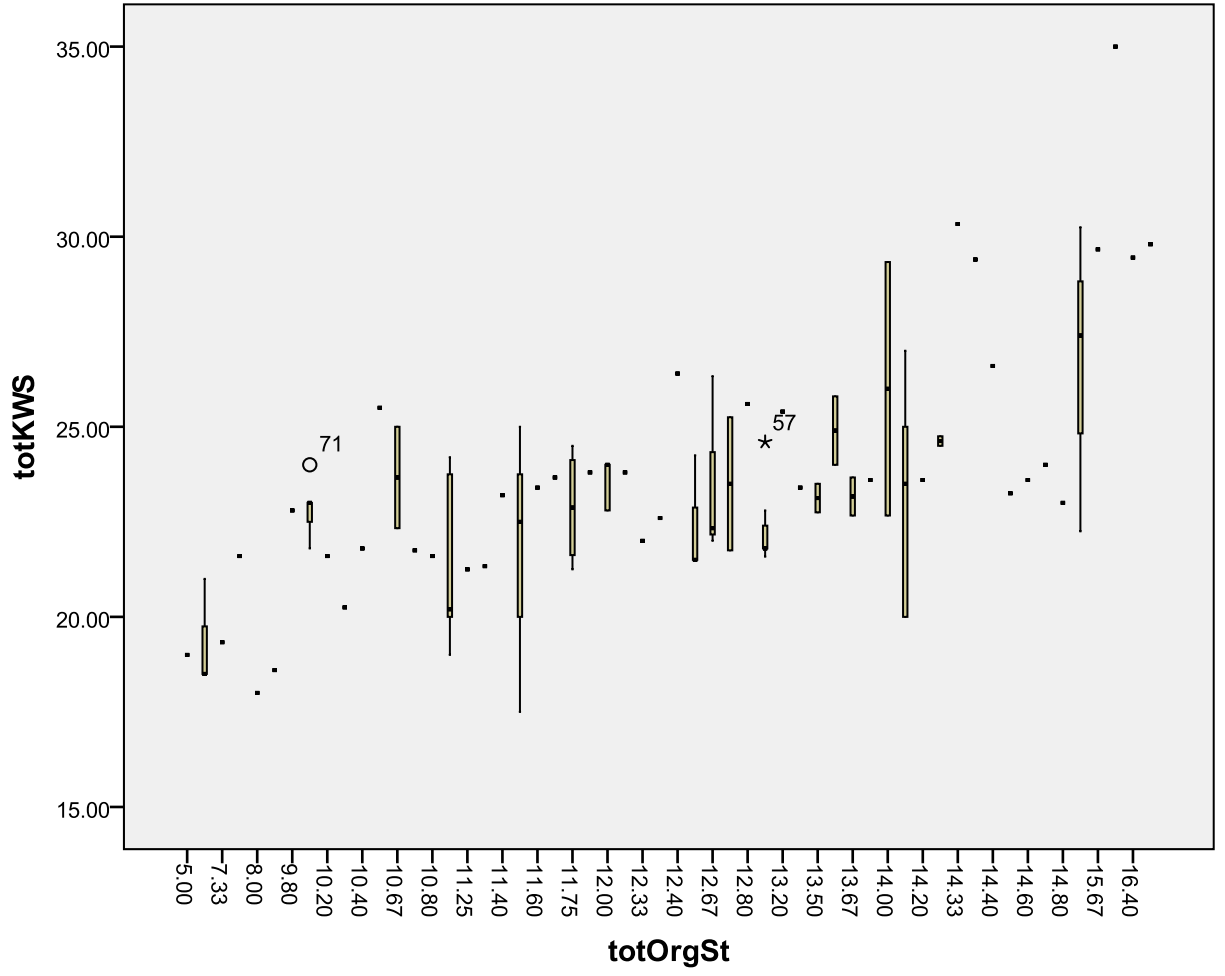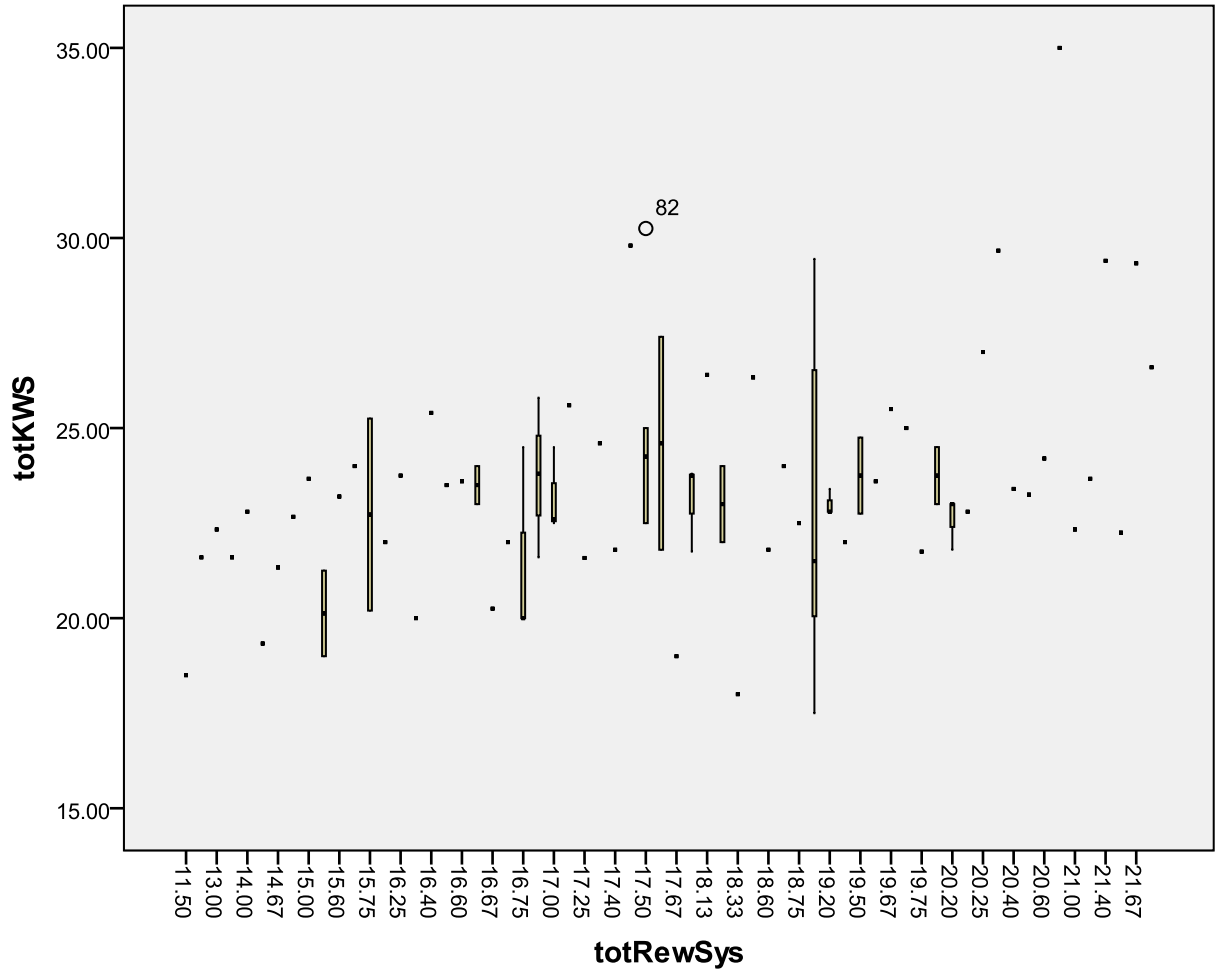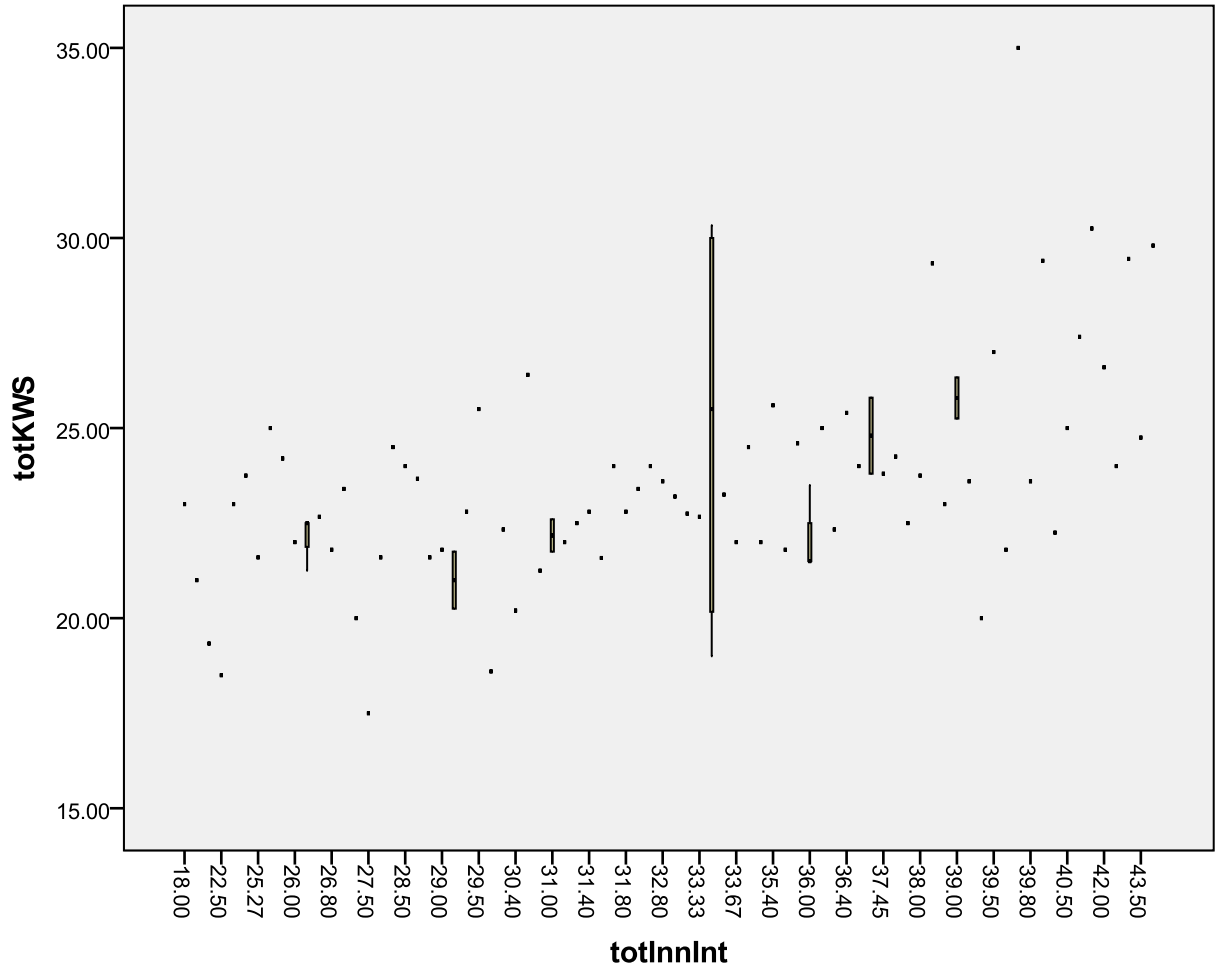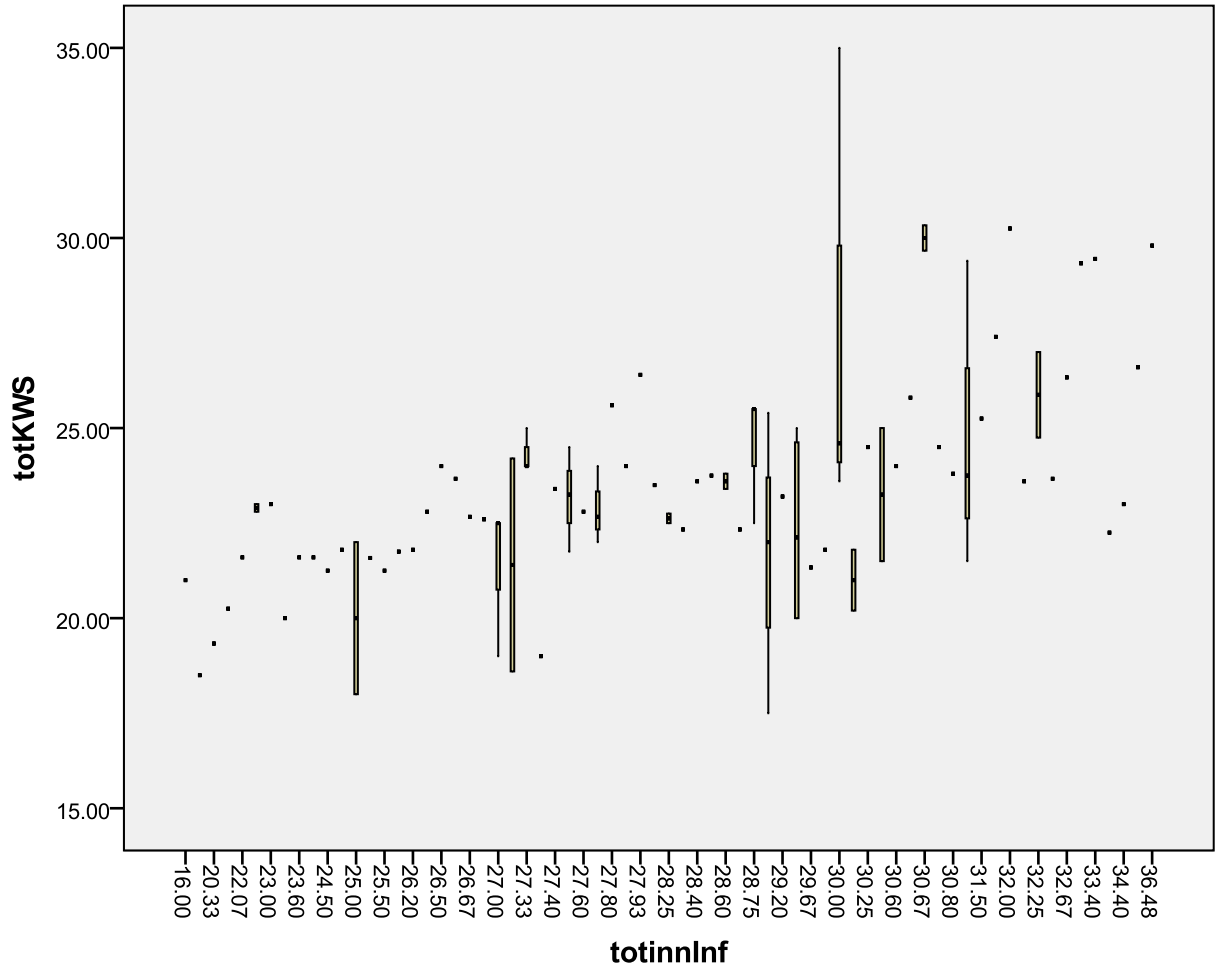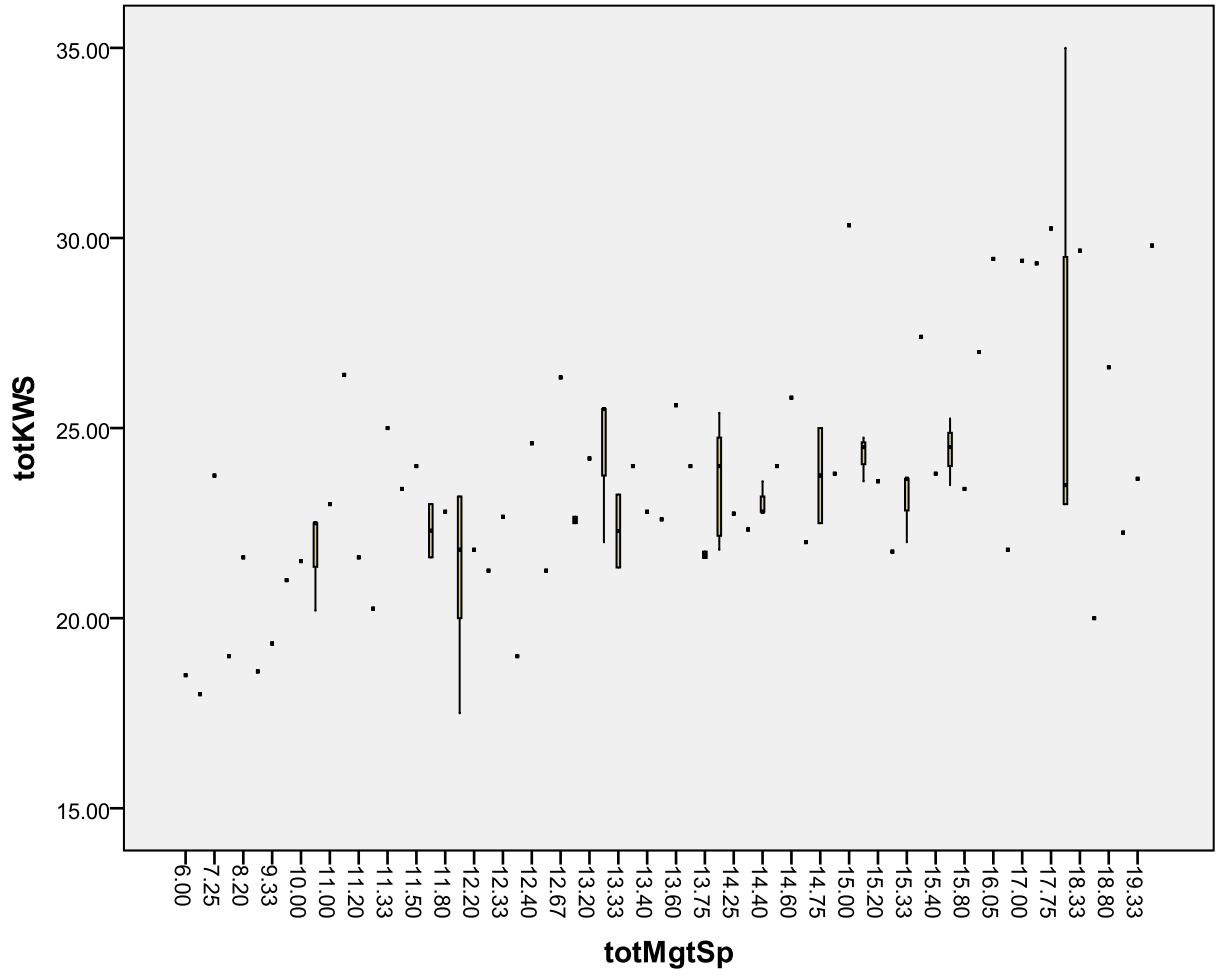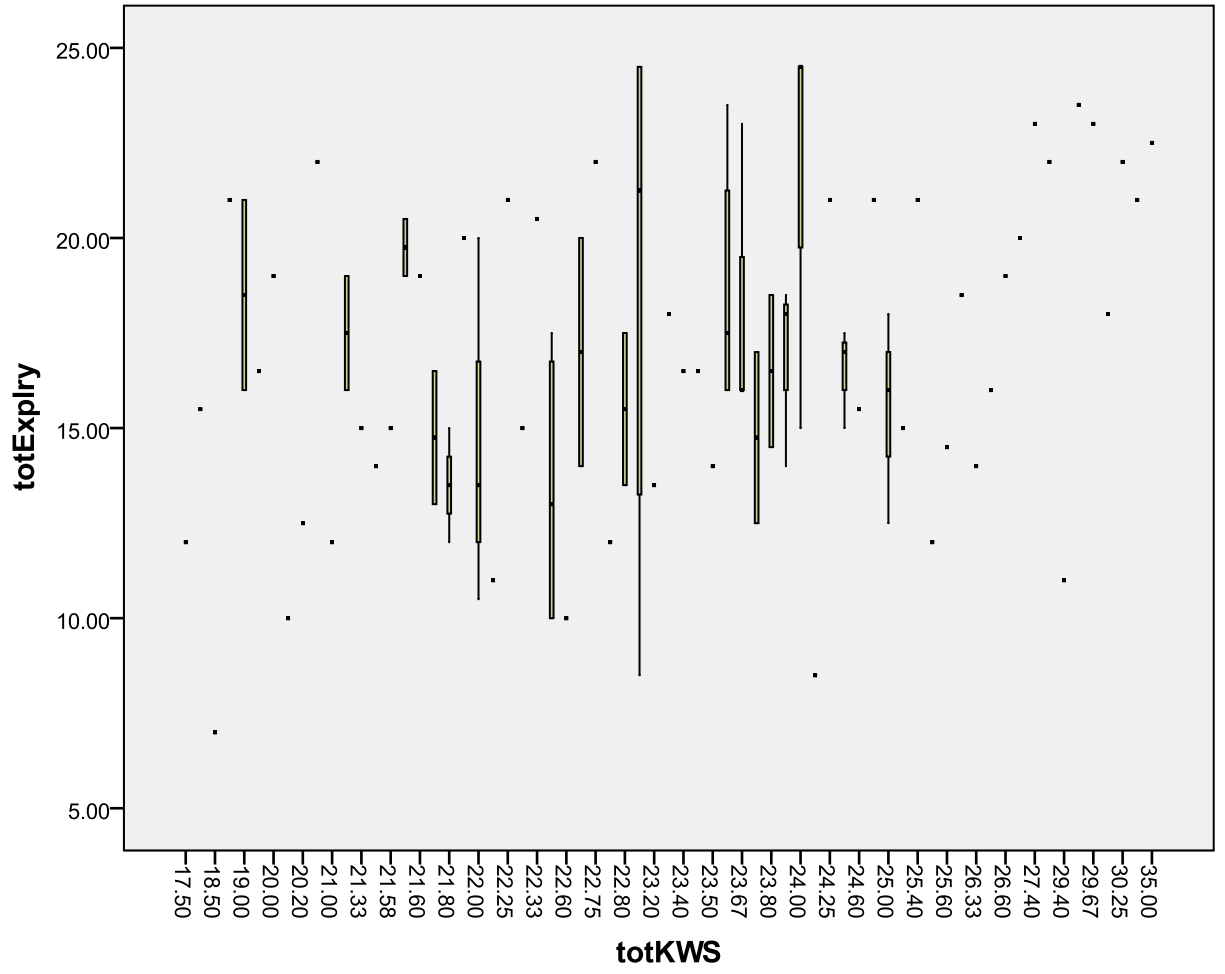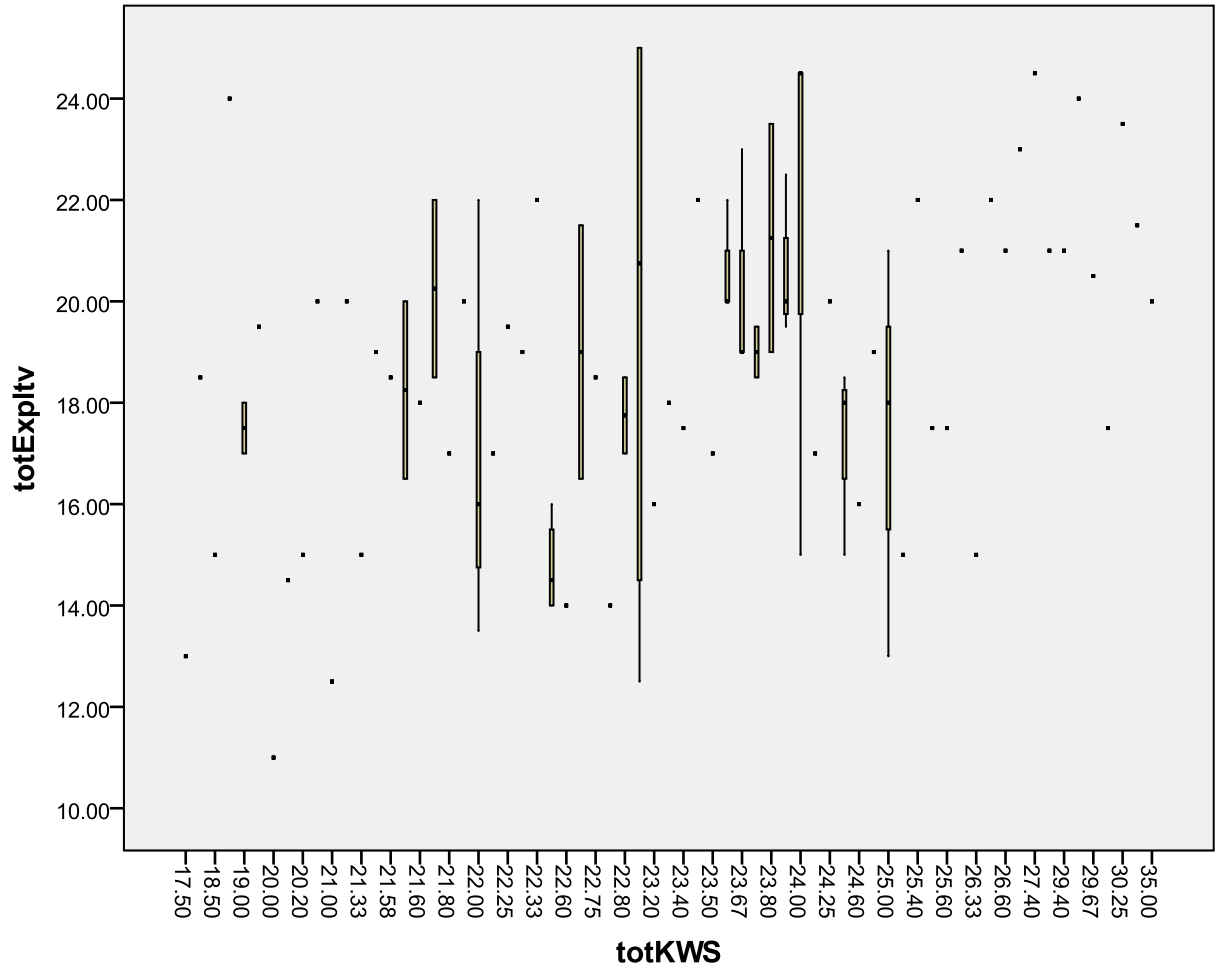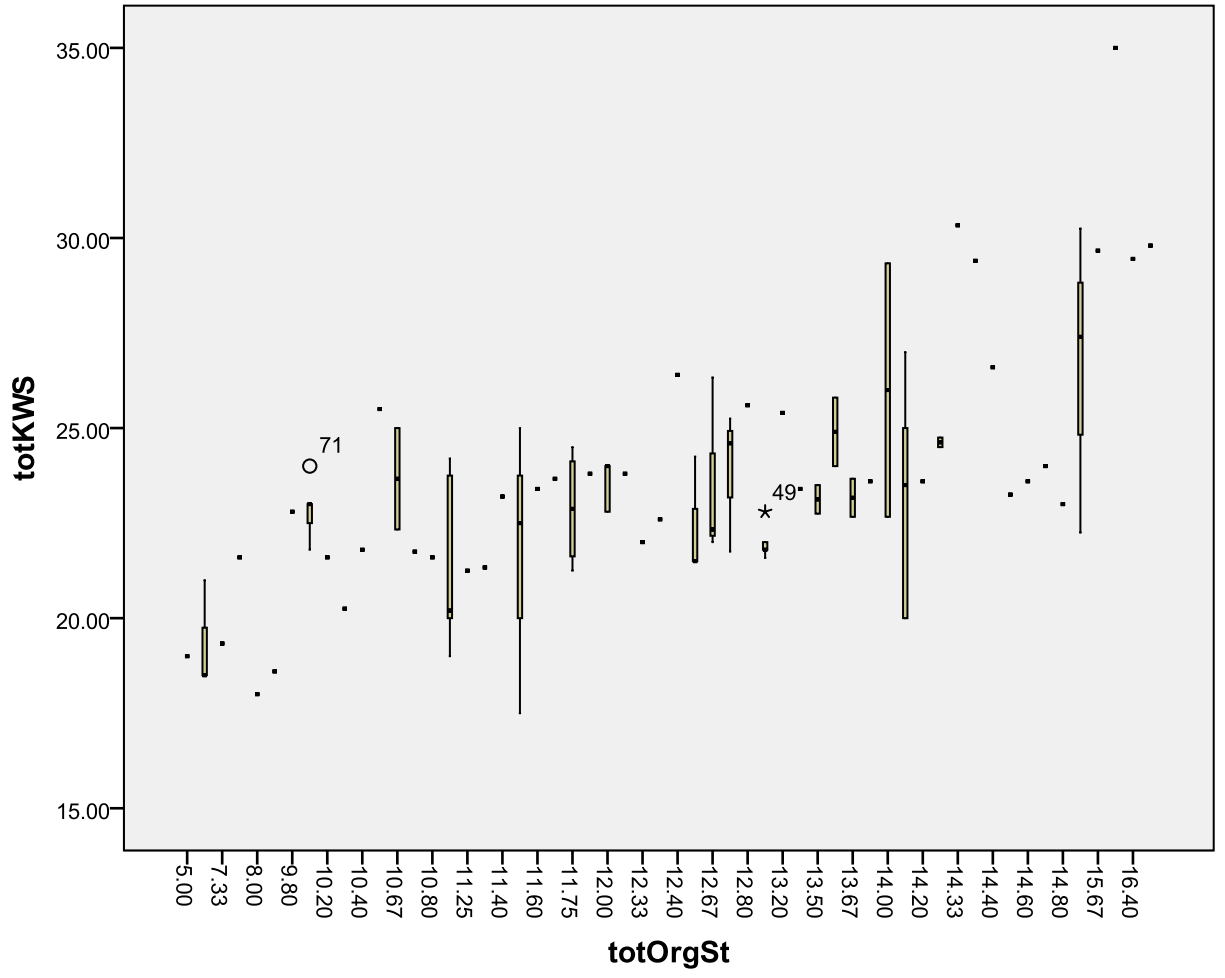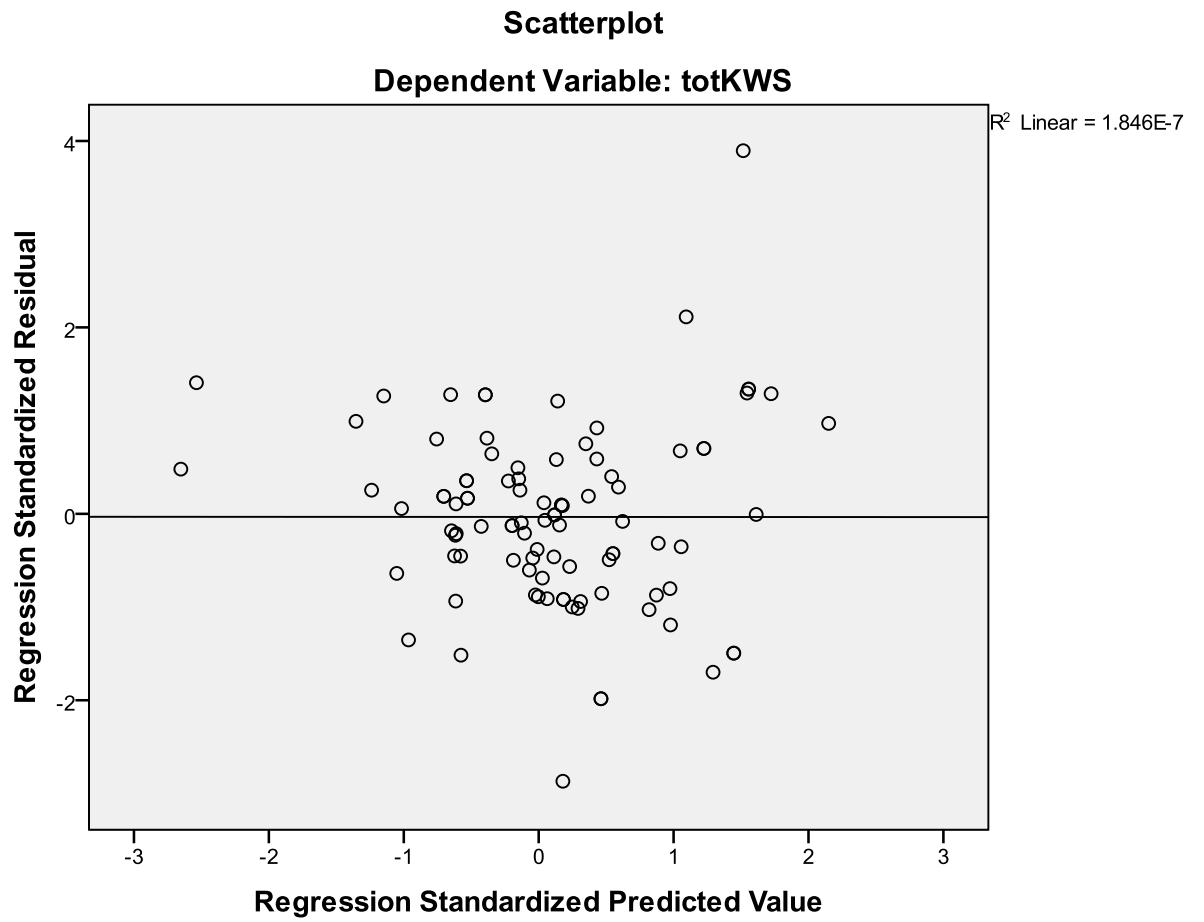
Scatterplot

Dependent Variable: totKWS

Partial Regression Plot

Dependent Variable: totKWS
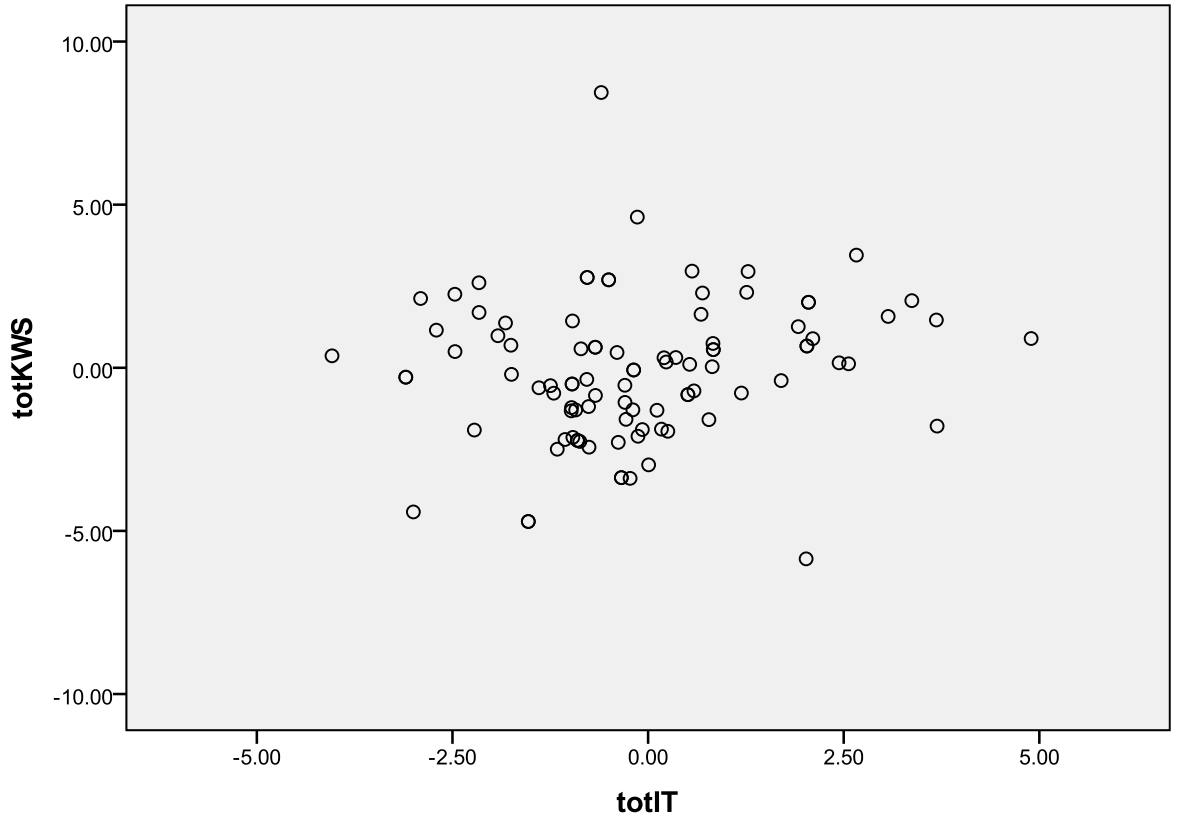
Partial Regression Plot

Dependent Variable: totKWS
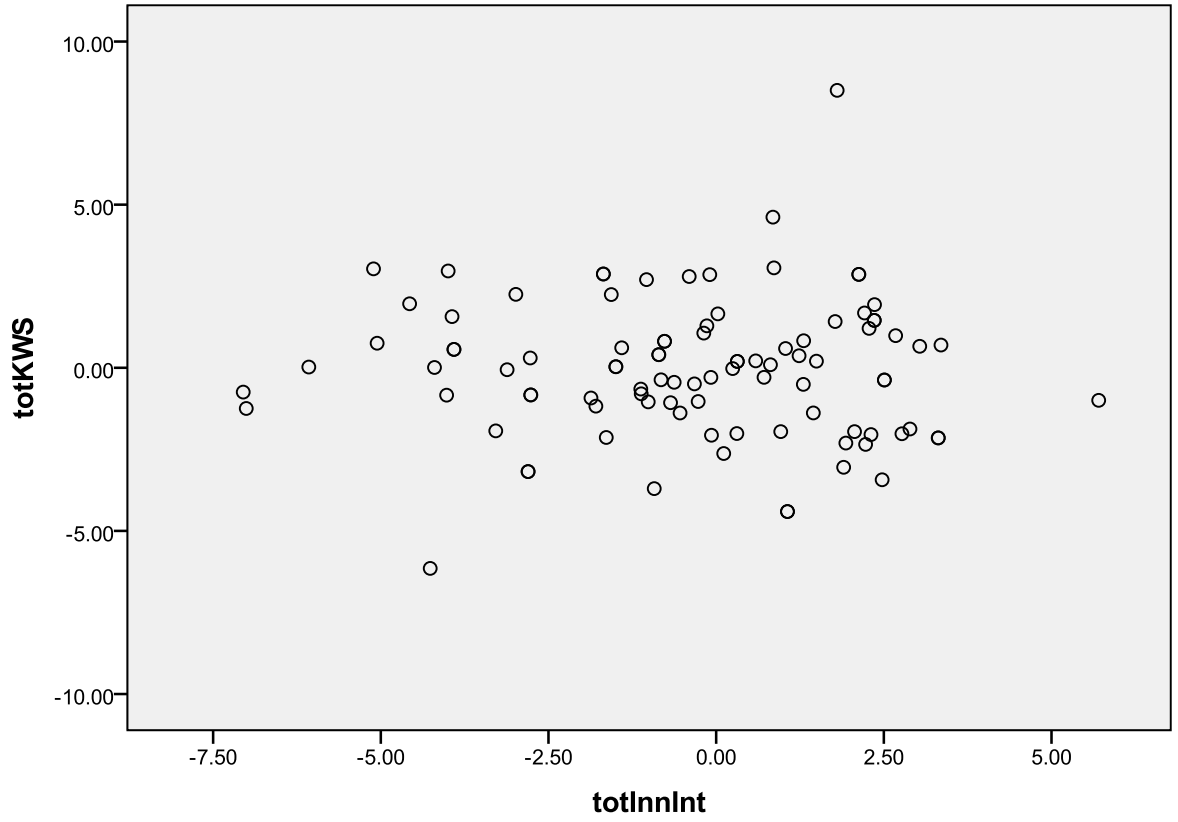
Partial Regression Plot

Dependent Variable: totKWS
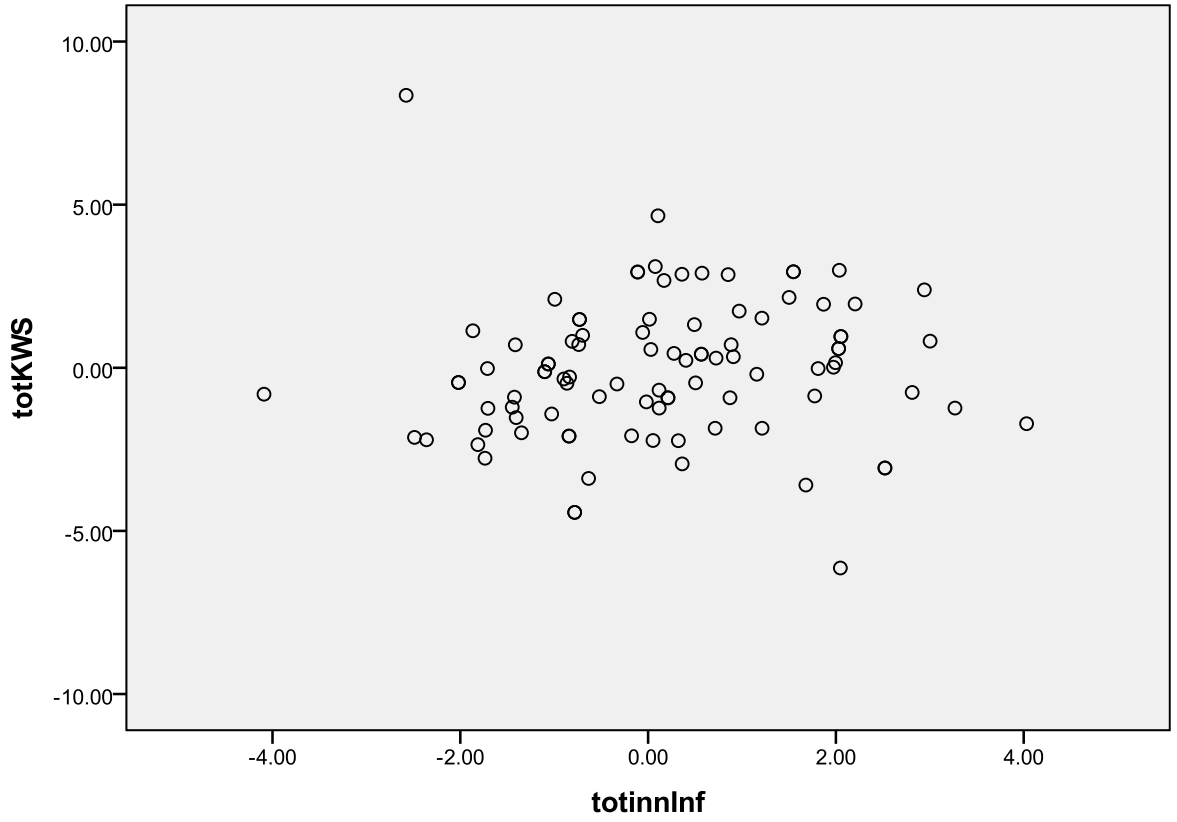
Partial Regression Plot

Dependent Variable: totKWS
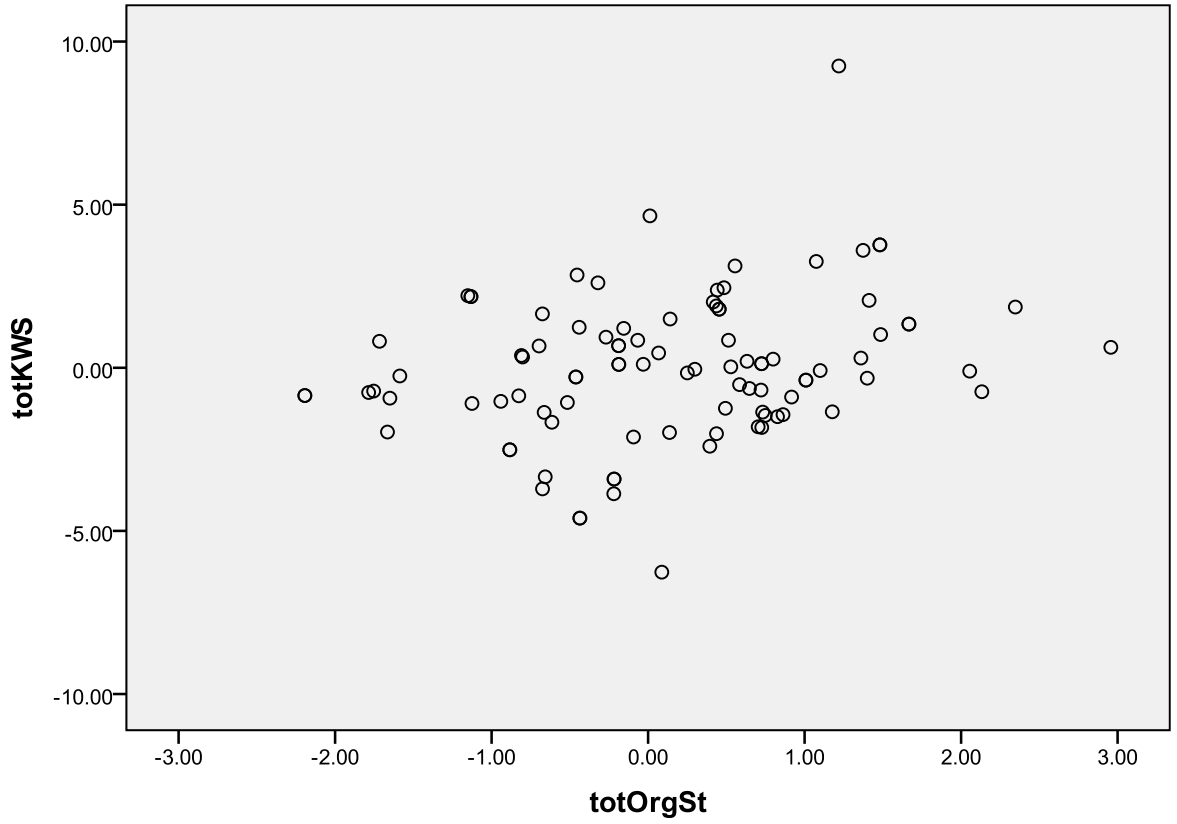
Partial Regression Plot

Dependent Variable: totKWS
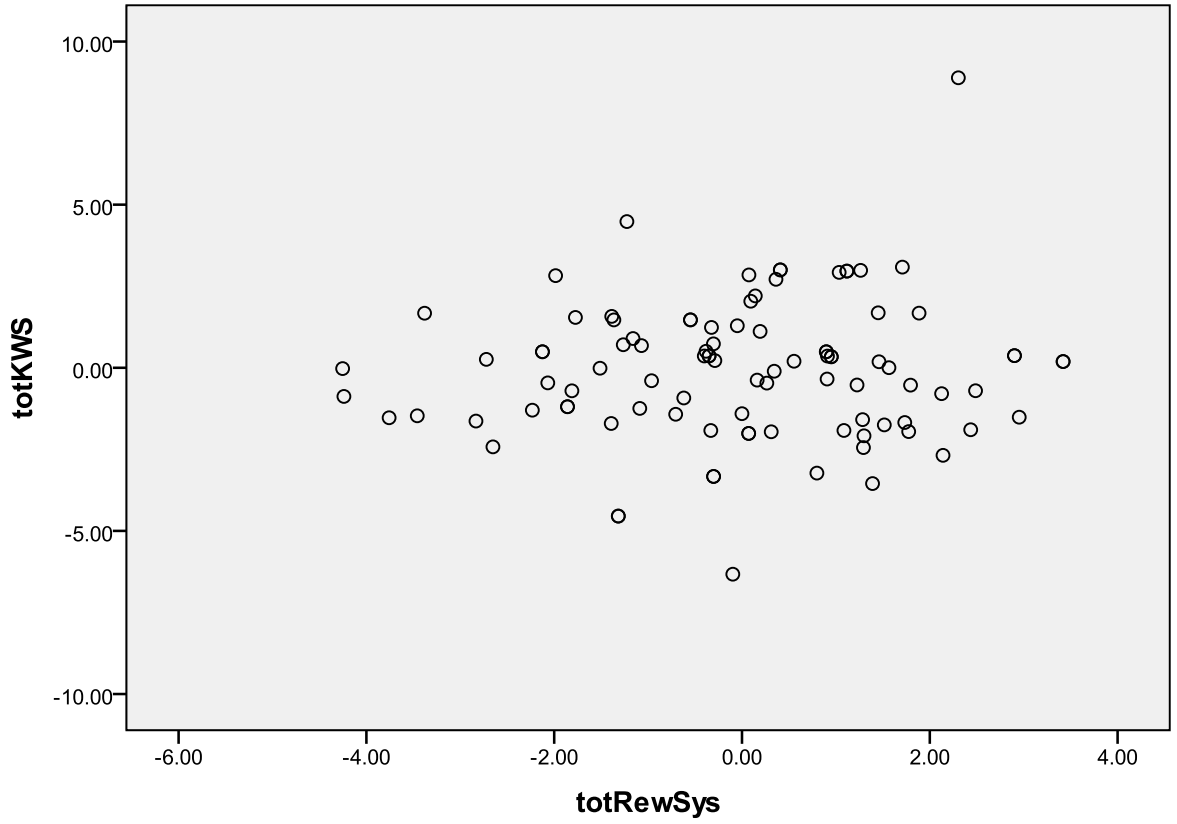
Partial Regression Plot

Dependent Variable: totKWS
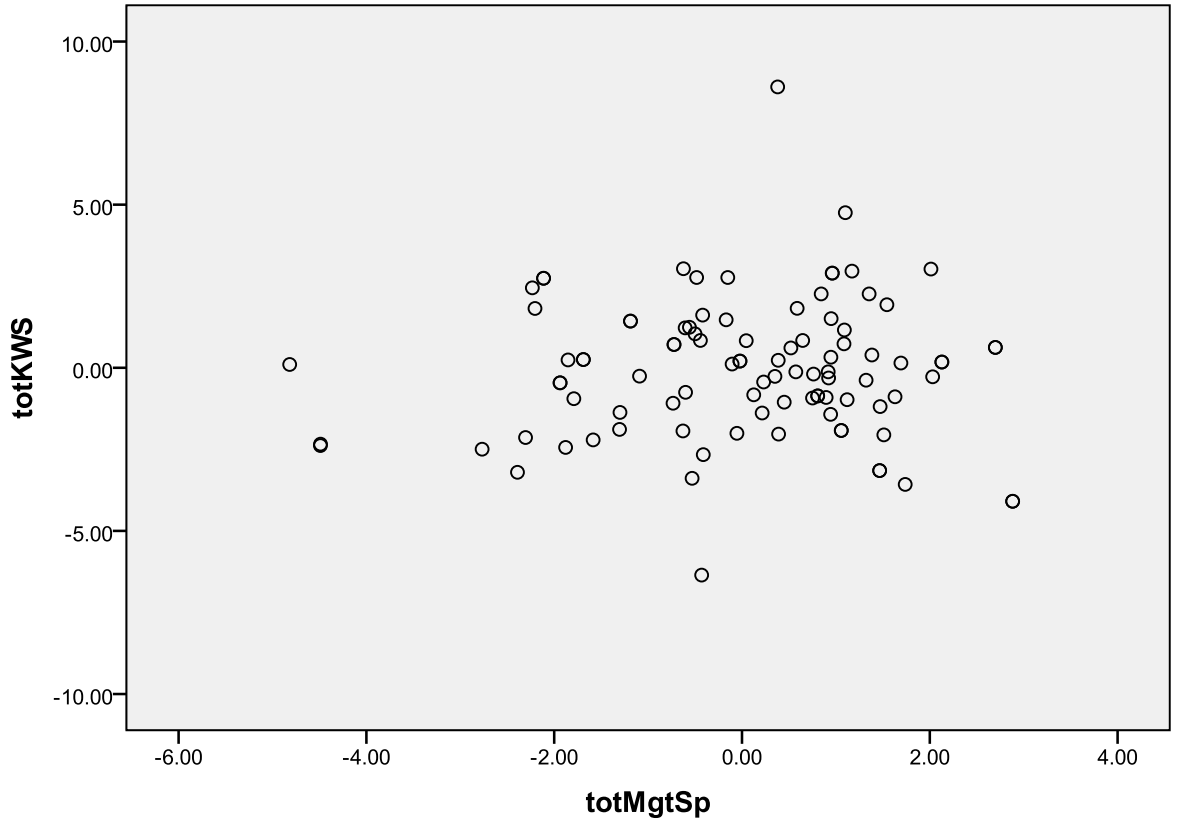
Scatterplot

Dependent Variable: totExplry
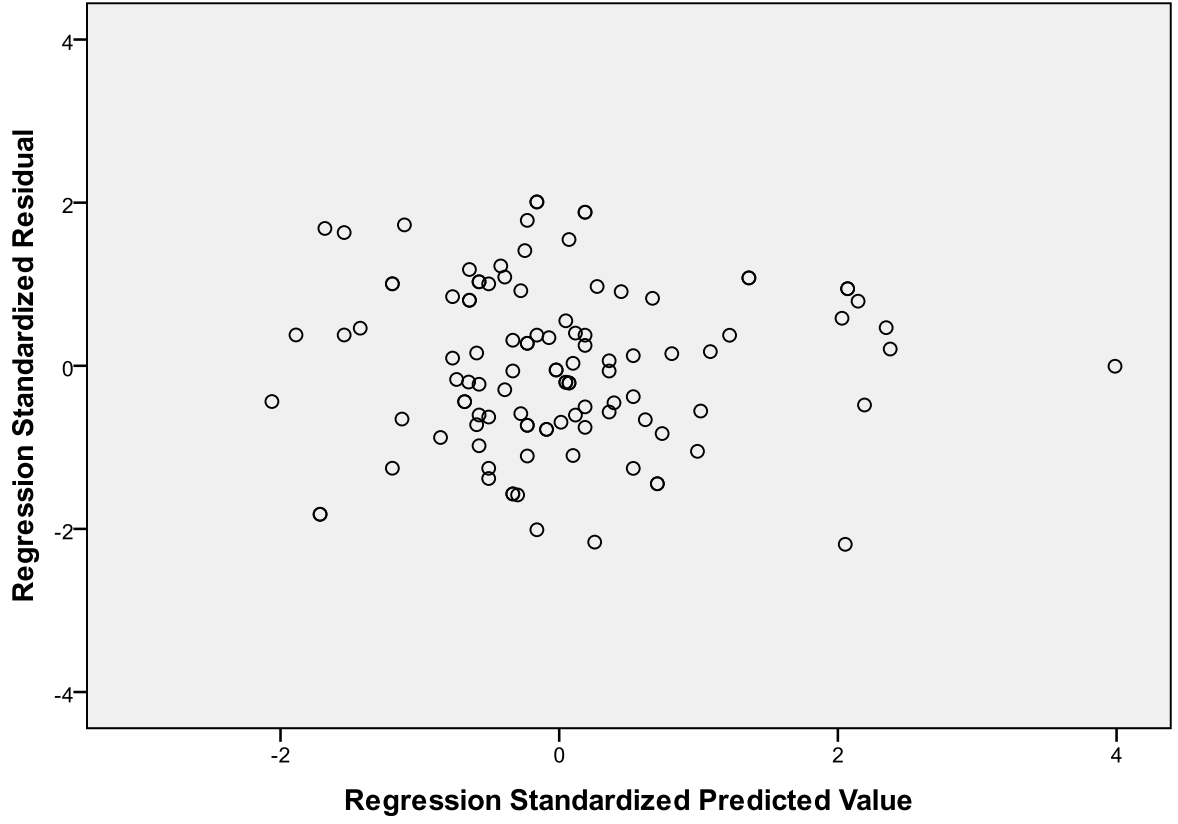
Scatterplot

Dependent Variable: totExpltv
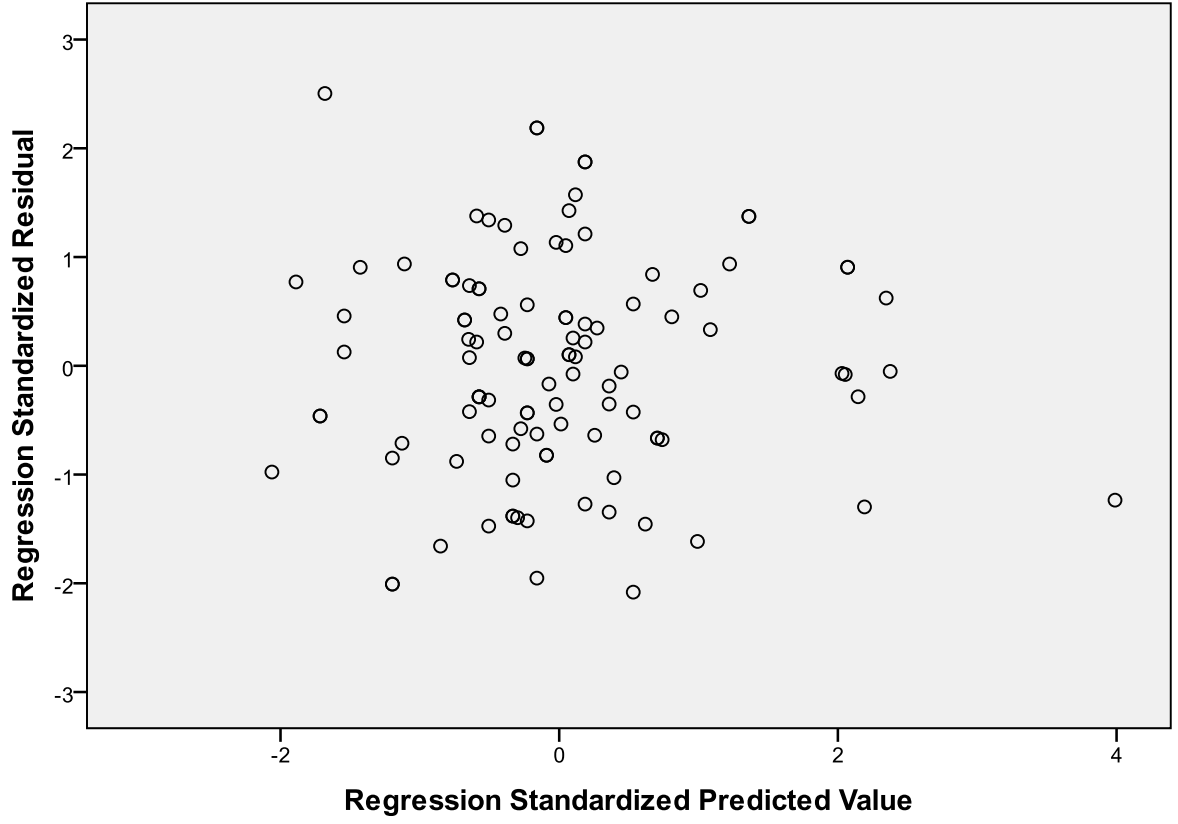
APPENDIX E – CONVERGENT VALIDITY

	creativity	exploratory	exploitative	IT	identification-obligation	innovation propensity	knowledge sharing	shared language	management support	organizational constituency	organizational Learning	organizational structure	reward system	structural social capital	shared norms	story usage	trust
IT1	0.135	0.256	0.168	**0.956**	0.306	0.421	0.279	0.271	0.326	0.260	0.437	0.398	0.203	0.447	0.339	0.241	0.202
IT2	0.178	0.210	0.127	**0.969**	0.280	0.400	0.262	0.237	0.304	0.242	0.412	0.407	0.195	0.426	0.373	0.215	0.211
IT3	0.193	0.223	0.155	**0.975**	0.317	0.402	0.263	0.231	0.308	0.235	0.403	0.406	0.165	0.411	0.337	0.218	0.227
IT4	0.245	0.234	0.071	**0.906**	0.235	0.307	0.219	0.255	0.207	0.183	0.347	0.359	0.115	0.414	0.285	0.287	0.211
InExplr1	-0.020	**0.746**	0.559	0.121	0.400	0.198	0.309	0.167	0.368	0.307	0.417	0.413	0.124	0.322	0.322	0.316	0.369
InExplr2	0.011	**0.921**	0.494	0.216	0.376	0.409	0.372	0.380	0.509	0.485	0.518	0.465	-0.055	0.290	0.285	0.455	0.375
InExplr3	0.132	**0.753**	0.356	0.171	0.220	0.158	0.157	0.282	0.279	0.205	0.293	0.197	0.098	0.213	0.155	0.330	0.161
InExplr4	0.020	**0.820**	0.460	0.192	0.245	0.248	0.234	0.204	0.387	0.401	0.403	0.389	0.014	0.125	0.172	0.285	0.322
InExplr5	-0.082	**0.678**	0.413	0.367	0.253	0.291	0.127	0.208	0.379	0.305	0.350	0.385	0.064	0.282	0.138	0.107	0.166
InExplt1	-0.026	0.584	**0.813**	0.148	0.287	0.130	0.268	0.145	0.268	0.316	0.312	0.300	0.121	0.248	0.212	0.161	0.248
InExplt2	0.097	0.236	**0.804**	0.140	0.293	0.149	0.322	0.151	0.184	0.237	0.295	0.284	0.208	0.139	0.187	0.241	0.234
InExplt3	0.045	0.473	**0.818**	0.082	0.301	0.055	0.283	0.090	0.170	0.272	0.293	0.227	0.166	0.158	0.189	0.201	0.220
InExplt4	-0.018	0.599	**0.734**	0.069	0.286	0.119	0.278	0.195	0.249	0.211	0.338	0.324	0.167	0.092	0.132	0.108	0.182
InnInf1	0.116	0.510	0.324	0.320	0.407	0.365	0.308	0.333	0.578	0.527	**0.788**	0.528	0.114	0.216	0.371	0.244	0.298
InnInf2	0.246	0.430	0.322	0.401	0.548	0.477	0.530	0.340	0.639	0.627	**0.807**	0.702	0.213	0.233	0.527	0.334	0.574
InnInf3	0.159	0.483	0.390	0.358	0.578	0.524	0.515	0.354	0.673	0.683	**0.915**	0.667	0.134	0.155	0.489	0.277	0.533
InnInf4	0.152	0.429	0.377	0.323	0.471	0.353	0.427	0.296	0.611	0.622	**0.827**	0.606	0.171	0.120	0.362	0.202	0.462
InnInf5	0.204	0.267	0.170	0.319	0.506	0.553	0.398	0.283	0.673	0.718	**0.769**	0.647	0.139	0.153	0.447	0.168	0.410
InnInf6	**0.884**	0.019	0.100	0.288	0.172	0.060	0.260	0.235	0.146	0.212	0.255	0.248	0.354	0.142	0.362	0.194	0.305
InnInf7	**0.834**	-0.038	-0.072	0.065	0.166	0.059	0.171	0.043	0.038	0.032	0.116	0.131	0.167	0.105	0.288	0.104	0.317
InnInf8	**0.678**	0.092	0.024	0.040	0.092	0.126	0.154	0.121	0.023	0.200	0.119	0.232	0.135	0.195	0.090	0.257	0.233
InnInt1	0.377	0.310	0.229	0.152	0.372	0.428	0.424	0.272	0.474	**0.826**	0.598	0.521	0.086	0.087	0.434	0.262	0.542
InnInt2	0.170	0.364	0.215	0.166	0.345	0.438	0.343	0.288	0.502	**0.865**	0.627	0.484	-0.019	0.017	0.365	0.248	0.417
InnInt3	0.182	0.498	0.374	0.220	0.462	0.473	0.400	0.263	0.615	**0.868**	0.701	0.638	0.093	0.074	0.423	0.238	0.504
InnInt4	0.031	0.356	0.272	0.242	0.514	0.543	0.543	0.444	0.555	**0.852**	0.676	0.602	0.011	0.192	0.346	0.374	0.539
InnInt5	0.105	0.383	0.296	0.244	0.486	0.512	0.465	0.251	0.562	**0.872**	0.706	0.624	0.008	0.194	0.325	0.295	0.484
InnInt6	0.139	0.263	0.073	0.423	0.483	**0.948**	0.438	0.260	0.503	0.501	0.524	0.620	0.025	0.160	0.403	0.377	0.456
InnInt7	0.161	0.309	0.114	0.383	0.459	**0.942**	0.447	0.320	0.486	0.557	0.530	0.611	-0.020	0.168	0.398	0.476	0.495
InnInt8	0.120	0.294	0.129	0.434	0.453	**0.952**	0.400	0.346	0.523	0.526	0.507	0.624	0.009	0.200	0.324	0.444	0.488
InnInt9	0.022	0.359	0.186	0.339	0.452	**0.905**	0.483	0.270	0.601	0.501	0.501	0.634	-0.005	0.204	0.362	0.366	0.440
InnInt10	0.019	0.342	0.161	0.333	0.478	**0.939**	0.505	0.328	0.568	0.562	0.550	0.665	0.036	0.227	0.361	0.436	0.503

KWS1	0.287	0.318	0.263	0.263	0.470	0.452	**0.785**	0.320	0.505	0.396	0.501	0.613	0.129	0.269	0.524	0.388	0.552
KWS2	0.085	0.384	0.339	0.239	0.518	0.517	**0.890**	0.345	0.525	0.563	0.503	0.588	-0.024	0.293	0.375	0.416	0.630
KWS3	0.065	0.313	0.278	0.217	0.595	0.525	**0.866**	0.278	0.508	0.545	0.487	0.610	-0.018	0.297	0.417	0.404	0.690
KWS6	0.381	0.134	0.300	0.232	0.436	0.148	**0.734**	0.387	0.229	0.261	0.314	0.365	0.315	0.168	0.434	0.309	0.483
KWS7	0.302	0.126	0.307	0.134	0.481	0.235	**0.762**	0.313	0.319	0.261	0.361	0.441	0.178	0.223	0.465	0.271	0.492
Lang1	0.172	0.301	0.166	0.249	0.469	0.252	0.383	**0.870**	0.458	0.390	0.420	0.367	0.284	0.119	0.410	0.417	0.462
Lang2	0.218	0.257	0.181	0.260	0.436	0.212	0.372	**0.870**	0.350	0.298	0.347	0.308	0.228	0.301	0.397	0.540	0.427
Lang3	0.097	0.268	0.161	0.255	0.264	0.356	0.222	**0.793**	0.187	0.221	0.262	0.193	0.224	0.150	0.168	0.671	0.248
Lang4	0.121	0.272	0.095	0.098	0.272	0.272	0.360	**0.820**	0.213	0.304	0.270	0.198	0.184	0.051	0.266	0.639	0.361
MgtSup1	0.064	0.404	0.258	0.255	0.576	0.546	0.510	0.339	**0.930**	0.594	0.703	0.737	0.107	0.215	0.534	0.200	0.560
MgtSup2	0.132	0.399	0.173	0.286	0.546	0.529	0.459	0.291	**0.915**	0.566	0.715	0.722	0.077	0.260	0.471	0.180	0.567
MgtSup3	0.073	0.475	0.243	0.341	0.534	0.513	0.431	0.343	**0.929**	0.614	0.751	0.730	0.105	0.195	0.421	0.193	0.543
MgtSup4	0.103	0.529	0.310	0.252	0.573	0.527	0.545	0.372	**0.911**	0.568	0.686	0.720	0.139	0.241	0.447	0.249	0.609
OrgStr1	0.179	0.502	0.337	0.351	0.554	0.632	0.529	0.285	0.725	0.744	0.737	**0.842**	0.087	0.222	0.343	0.358	0.622
OrgStr2	0.216	0.394	0.269	0.384	0.531	0.588	0.550	0.267	0.675	0.574	0.633	**0.868**	0.148	0.280	0.417	0.295	0.623
OrgStr3	0.306	0.098	0.200	0.254	0.390	0.325	0.516	0.221	0.435	0.312	0.438	**0.638**	0.287	0.141	0.566	0.132	0.441
OrgStr4	0.116	0.499	0.327	0.321	0.560	0.598	0.499	0.250	0.676	0.514	0.653	**0.831**	0.152	0.395	0.397	0.355	0.537
RSC1	0.272	0.201	0.172	0.364	0.620	0.350	0.476	0.348	0.434	0.333	0.471	0.472	0.111	0.301	**0.924**	0.294	0.547
RSC2	0.280	0.301	0.305	0.309	0.670	0.408	0.555	0.349	0.545	0.436	0.565	0.574	0.156	0.275	**0.923**	0.247	0.614
RSC3	0.306	0.195	0.042	0.254	0.464	0.302	0.390	0.338	0.289	0.371	0.332	0.363	-0.010	0.206	**0.751**	0.372	0.621
RSC4	0.309	0.302	0.239	0.301	0.634	0.313	0.450	0.277	0.487	0.395	0.505	0.458	0.118	0.177	**0.895**	0.210	0.604
RSC5	0.366	0.277	0.159	0.089	0.683	0.418	0.640	0.392	0.494	0.412	0.431	0.544	0.042	0.248	0.630	0.424	**0.866**
RSC6	0.357	0.411	0.254	0.255	0.725	0.531	0.619	0.401	0.600	0.551	0.572	0.684	0.002	0.353	0.672	0.491	**0.914**
RSC7	0.225	0.326	0.299	0.234	0.781	0.476	0.630	0.353	0.570	0.565	0.531	0.663	0.067	0.300	0.521	0.338	**0.899**
RSC8	0.334	0.340	0.297	0.230	0.729	0.419	0.680	0.472	0.581	0.590	0.536	0.640	0.072	0.263	0.622	0.440	**0.931**
RSC9	0.113	0.352	0.204	0.266	**0.820**	0.466	0.473	0.355	0.561	0.520	0.555	0.546	-0.028	0.195	0.453	0.296	0.690
RSC10	0.125	0.388	0.365	0.345	**0.892**	0.460	0.596	0.470	0.626	0.452	0.587	0.653	0.159	0.309	0.600	0.365	0.745
RSC11	0.084	0.291	0.382	0.252	**0.876**	0.348	0.519	0.343	0.551	0.416	0.542	0.558	0.237	0.280	0.564	0.215	0.640
RSC12	0.263	0.313	0.320	0.176	**0.831**	0.396	0.536	0.323	0.392	0.381	0.419	0.451	0.222	0.217	0.646	0.377	0.671
RSC13	0.196	0.318	0.288	0.240	**0.858**	0.458	0.522	0.358	0.464	0.460	0.551	0.521	0.152	0.286	0.669	0.398	0.707
Rwsys1	0.292	-0.026	0.045	0.046	0.104	-0.052	-0.009	0.168	0.057	-0.012	0.115	0.074	**0.818**	0.073	0.044	-0.011	-0.024
Rwsys2	0.305	0.035	0.176	0.150	0.158	0.003	0.081	0.258	0.100	0.025	0.177	0.177	**0.979**	0.066	0.102	0.104	0.023
Rwsys3	0.296	-0.010	0.097	0.052	0.125	-0.095	0.014	0.196	0.038	0.010	0.119	0.084	**0.902**	0.068	0.076	0.030	0.010
Rwsys5	0.277	0.000	0.067	0.037	0.088	-0.046	-0.027	0.172	0.026	-0.013	0.107	0.056	**0.790**	0.087	0.062	0.038	-0.039
SSC1	0.067	0.268	0.230	0.360	0.154	0.097	0.179	0.126	0.165	0.052	0.157	0.261	0.107	**0.881**	0.225	0.167	0.163
SSC2	0.144	0.279	0.186	0.425	0.322	0.185	0.325	0.173	0.259	0.134	0.209	0.324	0.088	**0.955**	0.308	0.229	0.314
SSC3	0.232	0.244	0.142	0.386	0.263	0.231	0.293	0.145	0.162	0.124	0.132	0.255	0.006	**0.900**	0.245	0.323	0.299

SSC4	0.156	0.323	0.189	0.460	0.334	0.157	0.322	0.167	0.254	0.191	0.269	0.335	0.012	**0.931**	0.306	0.264	0.361
SSC5	0.166	0.258	0.161	0.332	0.219	0.230	0.236	0.220	0.247	0.097	0.156	0.254	0.039	**0.779**	0.108	0.315	0.233
Story1	0.242	0.327	0.182	0.269	0.289	0.419	0.365	0.684	0.144	0.314	0.231	0.269	0.141	0.274	0.242	**0.926**	0.368
Story2	0.217	0.420	0.196	0.220	0.398	0.410	0.416	0.651	0.220	0.295	0.269	0.344	0.113	0.271	0.274	**0.967**	0.477
Story3	0.193	0.424	0.265	0.250	0.398	0.451	0.461	0.618	0.266	0.367	0.342	0.398	0.098	0.318	0.333	**0.971**	0.478
Story4	0.220	0.405	0.225	0.224	0.382	0.430	0.460	0.618	0.214	0.318	0.307	0.341	0.131	0.261	0.337	**0.958**	0.454